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Summary of Section 12, Consequences Modeling

Purpose:

Section 12 provides an overview of the types of consequences addressed in the risk analysis. The four broad types of consequences considered are impacts to life safety, changes in water quality, ecosystem impacts, and economic consequences.

Methods of Analysis:

Life safety: A methodology was developed to assess the probabilities of exceeding different numbers of fatalities on Delta islands for given initiating events. For a given initiating event, levee failure sequences were defined in terms of the number of breaches and their locations on each island, and the time of the event. In this report, the probabilities of different numbers of fatalities estimated in the methodology are conditional on the levee failure sequence. These conditional probabilities are used in the risk analysis quantification to estimate the frequency of occurrence of different numbers of fatalities.

Changes in water quality: The Water Analysis Module (WAM) simulates direct, water-quality-related consequences of levee breach events in relation to salinity. WAM incorporates initial island flooding, upstream reservoir management response, Delta water operations, water quality (salinity) disruption of Delta irrigation, Delta net losses (or net consumptive water use), hydrodynamics, water quality (initially represented by salinity), and water export.

Ecosystem impacts: Analysis of the impacts of levee breaches on species of fish (“Aquatics”), aquatic and terrestrial vascular plants (“Terrestrial Vegetation”), and birds and mammals (“Terrestrial Wildlife”) began with creating conceptual models of the mechanisms through which impacts can occur. Species and groups were selected based on their status as endangered, threatened, or species of concern, or because of their important contributions to biodiversity or ecosystem processes.

Economic consequences: Economic costs are the net costs to the state economy without any consideration of who within the state bears that cost. Economic impacts include a variety of other economic measures, including the value of lost output, lost jobs, lost labor income, and lost value added. These measures are not additive with each other, and they should not be added to economic costs.

Main Findings:

This section presents the conditional consequences of levee failures for life safety, water quality, the ecosystem, and the economy. The probable losses to these resources are presented in Section 13 for present-day conditions and Section 14 for future conditions.

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The consequences of levee failures in the Sacramento–San Joaquin River Delta (Delta) and Suisun Marsh are far reaching. Often, the direct consequences to life and property are the most obvious to the general public, since the flooding shows up on the front pages of newspapers and on the evening news. Other consequences, like the costs to repair the damaged levees and recover the flooded areas, are not immediately evident. Short-term and long-term changes to the ecosystem are even harder to quantify. Other economic costs to the immediate flooded area and to the state can be substantial. The saltwater intrusion that can accompany a levee failure in the Delta can shut down the in-Delta and export water supplies to urban and agricultural water users. Also, there are economic impacts caused by economic linkages beyond the direct costs.

This section provides an overview of the types of consequences addressed. The goal is to provide a broad understanding of each type of consequence and recognition of aspects that are quantitatively evaluated versus other (often very important) aspects that could not be quantified. The four broad types of consequences considered are:

- Impacts to Life Safety
- Changes in Water Quality
- Ecosystem Impacts
- Economic Consequences

More details on the ecosystem and economics consequence analyses are provided in, respectively, the Impact to Ecosystem Technical Memorandum (TM) (URS/JBA 2008e) and the Economic Consequences TM (URS/JBA 2008f).

12.1 IMPACTS TO LIFE SAFETY

12.1.1 Estimation of Loss of Life Caused by Levee Breaches

This section describes the estimation of the potential loss of life caused by the flooding that would result from a levee breach on an island. Historically, many California floods caused by levee breaches have resulted in substantial property damage and economic losses. Some have also caused fatalities. Some recent Northern California levee breach events that resulted in fatalities include the 1955 and 1997 floods. Thirty-eight fatalities were reported after the 1955 levee breaches and the resulting flood that occurred near Yuba City (Roos 2007). The 1997 levee breaches and resulting floods in the San Joaquin River basin caused three fatalities (SafeLevee Web Site). The 2004 levee breach on Jones Tract required evacuation of tens of people, but caused no fatalities (DWR 2004).

The loss-of-life risk has increased over the years because of the rapid housing growth closer to areas behind levees that were built to protect farmland. Also, the past levee breaches in the Delta occurred under winter floods or normal (“sunny-day”) conditions. The levees have not been subjected to a significant seismic event. The loss-of-life risk from levee breaches caused by a seismic event is likely to be greater because such breaches could occur more rapidly, leaving less public warning time and making evacuation less likely.

A methodology was developed to assess the probabilities of exceeding different numbers of fatalities on Delta islands for given initiating events. For a given initiating event, *levee failure* *sequences* were defined in terms of the number of breaches and their locations on each island, and the time of the event. In this report, the probabilities of different numbers of fatalities estimated in the methodology are conditional on the levee failure sequence. These conditional probabilities are used in the risk analysis quantification to estimate the frequency of occurrence of different numbers of fatalities.

Many of the current models/procedures for the estimation of loss of life from flooding have been derived based on empirical data from dam failures. Some of these models are briefly described below.

Graham (1999) describes a procedure to estimate loss of life from dam failures using three factors – flood severity level, warning time for people to evacuate before being impacted by flood waters, and the warning issuers' understanding of the flood severity. In his 1999 published paper, Graham recommended assigning fatality rates for different combinations of these three factors. This procedure has been enhanced since its original publication (Graham, personal communication, 2008). The enhanced procedure provides a method to estimate the percentage of people at risk that would be evacuated to safety. Fatality rates are then estimated that would be applied to the remaining population in the flood impact area.

Aboelata et al. (2003) describe a life-loss simulation model, LIFESim, which comprises four modules – flood routing, loss of shelter, warning and evacuation, and empirical fatality rates. The fatality rates are dependent on lethality zones that distinguish physical flood environments with significantly different destructive forces. The destructive forces are characterized by the interplay between available shelter and local flood depths, velocities, and presence of debris.

The LIFESIM model can be implemented in both deterministic and uncertainty modes. In the deterministic mode, best estimates of the input parameters are used to calculate the expected loss of life in different geographic areas impacted by a flood. In the uncertainty mode, probability distributions are assessed for the input parameters and the probability distribution of the number of fatalities is derived.

Johnstone et al. (2005) describe a Life Safety Model developed by BC Hydro to assess the loss of life caused by an extreme flood event such as one caused by a dam failure. The key model inputs include representations of the natural environment (topography, water bodies), the socio-economic environment (people, buildings, vehicles, and roads), and the flood wave. The life safety simulator incorporates physical equations and logic to estimate the potential loss of life for different flood wave scenarios. The simulated output includes the estimated loss of life and dynamic computer-graphics visualizations of flood progression and resulting life safety impacts.

The Federal Emergency Management Agency has developed the HAZUS model (FEMA 2004) that uses a geographic information system (GIS)-based system to estimate loss of life from flood events. Census data are used to estimate spatial distribution of population and facilities in the potential flood impact area.

For purposes of the Delta Risk Management Strategy (DRMS) study, it was necessary to estimate the loss of life that may result from one or more levee breaches on one or more islands during the same levee failure sequence. Also, the study was based on readily available GIS data on facilities and structures on different islands in the Delta. Data were not available on such factors as type of structures present in each island and number of floors in each structure. Because of these considerations, a relatively simple, high-level model was desired. The consulting team used the basic framework of the LIFESim model to develop a model that would provide reasonable estimates of loss of life for the modeled levee failure sequences.

Section 12.1.1 describes the main elements of the loss-of-life model developed for the DRMS analysis. Results and discussion are presented in Section 12.1.7. Appendix 12A contains the results of the flood routing analysis. Appendix 12B contains the demographics data used in the analysis. Appendix 12C contains the detailed results of the estimated fatality risks for different islands. Appendix 12D includes an example to illustrate the calculation of probabilities of exceeding different number of fatalities for a given levee failure sequence.

A model was developed to estimate the loss of life on each Delta island for a set of levee failure sequences. Three types of initiating events were considered – flood, seismic, and normal ("sunny day"). These events have different effects on the breach development process and warning time and hence the events are analyzed separately. Two e*xposure* cases were considered – daytime breach and nighttime breach. These cases affect the amount of warning time available after a breach, and that variation can result in different numbers of lives lost. The three types of initiating events and two exposure cases define six different levee failure scenarios.

The main modules of the life-loss estimation model were:

- Flood routing module
- Population exposure module
- Warning and evacuation module
- Life-loss fraction module
- Life-loss calculation module

A brief description of each module follows.

12.1.2 Flood Routing Module

For each initiating event, a levee breach initiation and development process was defined. Flood routing analysis was performed to assess the velocity and depth of flooding and the inundation area at different times from the time of breach initiation.

Johnstone et al. (2005) provide references for defining the thresholds of the product (flood depth, d × flood velocity, v) at which buildings would experience total and partial damage. Based on this information, thresholds of 7 and 3 square meters per second (m^2/s) were assumed for dv for total and partial building damage, respectively.

The threshold dv of 7 m^2/s was used to define the high flood severity zone within which all buildings would collapse and people in this zone would not be able to find shelter within any building. The threshold dv of 3 m^2/s was used to define the medium flood severity zone within which buildings would be damaged, but remain standing, and could provide shelter from a flood. The threshold dv of less than 3 m^2/s was used to define the low flood severity zone. The high, medium, and low flood severity zones defined for this analysis approximately correspond to the *chance*, *compromise*, and *safe* zones defined in the LIFESim model (Aboelata et al. 2003).

The flood routing analysis suggested that the initiating event and the size of the island would make a significant difference in the delineation of the flood severity zones. As noted previously, three initiating events were analyzed – flood, seismic, and sunny-day. For flood routing analysis, flood and sunny-day events were considered to be similar because the breaching process would be similar.

Two categories of islands were defined based on their sizes – large and small. A large island was defined as one with a major axis of more than 5,000 feet. The distance to the boundary of each flood severity zone and the time to reach that boundary were assessed separately for the different combinations of the initiating event and island size.

Table 12–1 summarizes the results for each combination of initiating event and island size. Details of the flood routing analysis are described in Appendix 12A.

12.1.3 Population Exposure Module

The continuous perimeter of the levee around an island was divided into eight sectors corresponding to four main geographic directions (N, S, E, and W) and four intermediate directions (NW, NE, SW, and SE)[1]. A breach on the arc of any given sector was assumed to occur at the mid-point of the arc. Given a breach on a particular arc sector, the inundation area within each flood severity zone was delineated.

Using GIS demographic data files, the population within each flood severity zone was estimated. Three separate population groups were considered – permanent (nighttime) population, daytime population, and highway users. The permanent population was estimated using the U.S. census data by census blocks. The population within each census block was assumed to be uniformly distributed. If the census block was mostly outside the flood zone for a particular sector on an island, aerial digital pictures of the island were reviewed and the population estimated for an adjacent comparable sector was assigned to the sector under consideration.

For nighttime exposure, it was assumed that the permanent population would be in houses/buildings. For daytime exposure, the daytime population was estimated based on the U.S. Census Bureau database on daytime population (U.S. Census 2008). This population includes the portion of the permanent population that works on the island and any transient population (e.g., workers) that visits the island during the daytime. If a highway was on the breached levee, the number of highway vehicles was estimated assuming an average spacing of 20 feet between vehicles and an average of two persons per vehicle.

Appendix 12B shows the estimated population in each group for each island (labeled “Analysis Zone”), initiating event, breach sector, and flood severity zone.

12.1.4 Warning and Evacuation Module

12.1.4.1 Flood Event

If the initiating event is a flood, systematic and frequent monitoring and surveillance of the levees are likely to be conducted as the floodwater rises. Both local agencies/owners of individual islands as well as state and federal agencies would be involved in such monitoring and surveillance. Also, a levee breach is likely to be preceded by such indicators as sand boils and

[1] These are the same sectors used in the emergency response and repair model.

water seepage, which are likely to provide an advance warning of an impending failure. Furthermore, a flood-initiated breach is likely to develop slowly, thus allowing more time to detect it.

Experience with the 2004 Jones Tract levee failure suggests that "Delta Levee Failure Incident" protocols would be established after a levee failure that specify coordination and mobilization of appropriate local, state, and federal agencies (DWR 2004). The protocols include communication procedures to enable rapid and effective warnings to all affected areas, including remote areas. Evacuation procedures and protocols are also a part of the emergency response planning.

Because of these factors, a levee breach during a flood event would likely be quickly detected and emergency response procedures would be promptly initiated. However, the breach detection time for a nighttime breach would likely be greater than for a daytime breach.

The experience with the 2004 Jones Tract breach provides a useful validation point. This breach occurred with no forewarning on a non-project levee outside the normal flood season. Even then, the breach was detected in minutes and evacuation began in less than 30 minutes (DWR 2004). According to the U.S. census data, the estimated population on the island is around 40. There was no loss of life as a result of the flooding that occurred after this breach.

These considerations were used to estimate the warning issuance time; that is, the time after a breach initiation at which warnings would be issued to the population at risk. The warning time is primarily dependent on how quickly a levee breach would be detected. Once a levee breach is detected, emergency response planning procedures would be used to disseminate public warnings. For any initiating event, a daytime breach would likely be seen by people in the vicinity and calls to the emergency number would likely be made within minutes after the breach occurs. On the other hand, a nighttime breach under any initiating event may not be seen and would likely be detected only after some people are actually impacted by the resulting flood.

These considerations suggest that the warning time would be sensitive to the time category of breach, but would not depend on the initiating event. Accordingly, the warning issuance times were estimated to be 6 minutes and 30 minutes, respectively, for a daytime and nighttime breach.

Table 12–2 summarizes the warning issuance times for daytime and nighttime exposure. Note that, for a given exposure time, the warning issuance time is assessed to be the same for all initiating events.

Once a warning is issued, evacuation of people at risk would begin. The effectiveness of evacuation may be defined in terms of the percentage of the people in the risk area that would be evacuated safely. This effectiveness is influenced by several factors: the key factors being emergency response planning procedures that are in place and have been tested, availability of private vehicles to move out of the danger zone, the exposure time (daytime versus nighttime), and the *evacuation time window* (i.e., the time between the warning issued to a community at risk and the time at which flood waves arrive at a location). As noted above, emergency response planning procedures have been used in recent levee failures. Most people living in the Delta islands own cars that they can use for purposes of evacuation.

Using this information, the evacuation effectiveness was estimated as a function of the evacuation time window and breach exposure time scenario. Table 12–3 summarizes the evacuation effectiveness results. For a daytime breach, the evacuation effectiveness is assessed to be 0 percent when the evacuation time is 0 or less (i.e., the flood waves arrive before the resident receives any warning), 80 percent when the evacuation time is half an hour, 100 percent when the evacuation time window is greater than half an hour. This is consistent with the 2004 Jones Tract levee failure experience (DWR 2004). For a nighttime breach, the evacuation effectiveness is assessed to be 0 percent when the evacuation time is 0 or less, 80 percent when the evacuation time is 1 hour, 100 percent when the evacuation time window is greater than 1 hour.

12.1.4.2 Seismic Event

An earthquake could cause a levee breach without much warning. Such a breach develops rapidly, reaching its full size in minutes. Also, multiple simultaneous breaches may occur on an island as a result of a single seismic event. There is no empirical data on seismically induced breaches in the Delta. As noted previously, the warning issuance time is sensitive to the exposure time (day or night), but is likely to be independent of the initiating event.

The warning issuance time for a seismically induced breach for a given exposure time (day or night) was assumed to be the same as those for a flood-induced breach. Table 12–2 shows these times for a seismic event.

Evacuation effectiveness would be affected because of damage to roads and bridges, and confusion and competing concerns after an earthquake. It was assumed that the evacuation of all people at risk would take longer for a seismic event than for a flood event. The estimated evacuation effectiveness for a seismic event is shown in Table 12–3.

12.1.4.3 "Sunny-Day" Failure Event

For a sunny-day event, the warning issuance time for a given exposure time (day or night) is likely to be the same as that for a flood event. On the other hand, the evacuation effectiveness is likely to be greater because only an isolated breach would occur rather than possible multiple breaches that would put a greater demand on available resources. Table 12–2 shows the assessed warning issuance time and Table 12–3 shows the assessed evacuation effectiveness for a sunny-day event. The Jones Tract breach of 2004 provides a reasonable validation for the assumed values of these parameters.

12.1.5 Life-Loss Fraction Module

Aboelata et al. (2003) developed empirical distributions of life-loss fractions for *chance*, *compromise*, and *safe* flood lethality zones. As noted previously, the lethality zones used in the LIFESim model approximately correspond to the high, medium, and low flood severity zones defined in the present analysis. The LIFESim empirical distributions were based on data from historical dam failures. The life loss in the low flood severity ("safe") zone was zero. Normal probability distributions were fitted to the empirical distributions for the high flood severity ("chance") and medium flood severity ("compromise") zones.

Figure 12–1 compares the two sets of distributions. The comparison shows that the normal distribution fits the empirical distributions reasonably well. For analytical convenience, the normal distributions were used in this analysis. Because the life-loss fractions must be between 0 and 1, the normal distributions were constrained to remain between these two end points. Table 12–4 summarizes the statistical parameters of the normal distribution of the life-loss fraction for each flood severity zone.

12.1.6 Life-Loss Calculation Module

For each breach defined by a given levee failure sequence, the mean and variance of the number of fatalities in each flood severity zone were calculated using the following equations:

$$m(n_i) = m(f_i) \times N_i \tag{1}$$

$$s^2(n_i) = s^2(f_i) \times N_i^2 \tag{2}$$

in which n_i = number of fatalities in i^{th} zone

$m(n_i)$ = mean number of fatalities in i^{th} zone

f_i = fraction life-loss for i^{th} zone

$m(f_i)$ = mean fraction life-loss for i^{th} zone

N_i = post-evacuation population in i^{th} zone

$s^2(n_i)$ = variance of n_i

$s^2(f_i)$ = variance of f_i

The total number of fatalities, n, over all flood severity zones, on an island from a given breach is given by:

$$n = \sum_i n_i \tag{3}$$

The mean number of fatalities over all flood severity zones on an island from a given breach was calculated from the following equation:

$$m(n) = \sum_i m(n_i) \tag{4}$$

The numbers of fatalities in different flood severity zones on an island for a given breach are likely to be highly correlated, because the warning time and evacuation effectiveness would be affected by a common set of factors for all flood severity zones. The variance of the number of fatalities combined over all flood severity zones on an island from a given breach was calculated from the following equation in which a perfect correlation was assumed between the numbers of fatalities in different flood severity zones:

$$s^2(n) = \sum_i s^2(n_i) + 2\sum_{i=1}^{k-1}\sum_{j=i+1}^{k} s(n_i)\, s(n_j) \tag{5}$$

Using the mean and variance of the total number of fatalities, n, over all flood severity zones on an island from a given breach, one can calculate the (conditional) probability of exceeding different number of fatalities given a breach, using the properties of the normal distribution. The probability that n will exceed a specific value n_1 is given by:

$$P[n > n_1] = 1 - \Phi\left[\frac{n_1 - m(n)}{s(n)}\right] \tag{6}$$

in which $\Phi[\cdot]$ = standard normal cumulative probability function.

The probability of zero fatalities is calculated by subtracting from 1 the probability of 1 or more fatalities. The probability of the number of fatalities exceeding the total exposed population is set equal to 0.

Equations similar to (4) and (5) can be used to calculate the mean and variance of the number of fatalities combined over multiple breaches on an island and over all islands with levee breaches caused by the same levee failure sequence. To develop the specific equations for this calculation, indices j and k are added to n to refer to kth breach on jth island. Let n_{jk} denote the number of fatalities from the kth breach on jth island for a given levee failure sequence. The total number of fatalities summed over all breaches on the jth island for a given levee failure sequence, $n_{j.}$, was calculated from:

$$n_{j.} = \sum_k n_{jk} \tag{7}$$

The mean of $n_{j.}$ was calculated from the following equation:

$$m(n_{j.}) = \sum_k m(n_{jk}) \tag{8}$$

in which $m(n_{jk})$ is the mean number of fatalities from the kth breach on the jth island, as calculated from Equation (4).

In calculating the variance of $n_{j.}$, perfect correlation was assumed between the numbers of fatalities from different breaches on the same island and same initiating event. This is because the warning issuance time and evacuation effectiveness are likely to be the same for all breaches on a given island. With this assumption, the variance of $n_{j.}$ was calculated from:

$$s^2(n_{j.}) = \sum_k s^2(n_{jk}) + 2\sum_{k=1}^{p_{j-1}} \sum_{m=k+1}^{p_j} s(n_{jk})\, s(n_{jm}) \tag{9}$$

in which p_j is the number of breaches on the jth island.

The total number of fatalities summed over all islands impacted by the levee failure sequence, $n_{..}$, is obtained from:

$$n_{..} = \sum_j n_{j.} \tag{10}$$

The mean of $n_{..}$ was calculated from:

$$m(n_{..}) = \sum_j m(n_{j.}) \tag{11}$$

In calculating the variance of $n_{..}$, the number of fatalities from different islands were assumed to be uncorrelated. This is because the evacuation effectiveness for different islands is likely to be different given differences in such factors as the topography and spatial distribution of population. With this assumption, the variance of $n_{..}$ was calculated from:

$$s^2(n_{..}) = \sum_j s^2(n_{j.}) \tag{12}$$

Appendix 12D contains an example that illustrates the calculation of the mean and variance of the number of fatalities for a given levee failure sequence, and the probabilities of exceeding different numbers of fatalities.

12.1.7 Results and Discussion

12.1.7.1 Summary of Results

Appendix 12C contains detailed results of the life-loss analysis, including the mean and standard deviation of the number of fatalities from a breach in each sector in each island for each initiating event type. The probability of zero fatalities and probabilities of exceeding different numbers of fatalities are also shown in this appendix. A summary of the key results and main findings is presented in this section.

Figure 12–2 shows a graph of the number of islands with different expected number of fatalities given a breach. The breach is assumed to occur in the sector that has the maximum population exposure. Figure 12–3 shows a graph of the number of islands with different (conditional) probabilities of five or more fatalities given a breach. The results are shown separately for the different combinations of the initiating event and exposure time (day and night). Figures 12–4 and 12–5 show similar results for the (conditional) probability of 10 or more and 100 or more fatalities, respectively, given a breach. Table 12–5 lists the islands that have greater than 10 percent (conditional) probability of 10 or more and 100 or more fatalities given a breach under different combinations of the initiating event and the exposure time. Figures 12–6 through 12–11 display the islands identified in Table 12–5.

12.1.7.2 Sensitivity Analysis and Limitations

The effect of changing some key parameters for the estimated fatality risks was assessed. This assessment showed that the estimated fatality risks are sensitive to certain parameters. The uncertainty in the estimates of these parameters was also assessed qualitatively. Both the sensitivity of results to key parameters and potential uncertainty in the estimates of these parameters are discussed below.

12.1.7.3 Breach Detection and Warning Issuance

The quicker a breach is detected and warnings to the population at risk are issued, the longer the time available for people to evacuate. Issuing notice in advance of flooding will reduce the number of individuals that remain in the flood danger zone and hence will reduce the number of fatalities.

For this analysis, we assumed that a daytime breach would be detected quicker than a nighttime breach. Furthermore, a breach caused by a seismic event is likely to occur without much advance indication and the time to detect such a breach would be longer than a breach caused by a flood or sunny-day event.

Best estimates of the time when warnings would issue after a breach occurs were made based on the 2003 Jones Tract breach experience and case studies on dam failures reported in the literature (Graham 1999). The current communications technology, including emergency call system and wide usage of cellular phones, may facilitate the process of warning people of flood danger. Individuals who observed a breach or floodwaters rushing into an island would likely to call others downstream from them who could be exposed to the rushing flood waters. This could result in at least some at-risk residents receiving more timely warnings, thus allowing more people to evacuate and move to safe grounds.

12.1.8 Evacuation Effectiveness

Give a certain amount of time available for evacuation, the model assumes that some proportion of the population in the potential flood danger zone would be able to evacuate. Using census data about the demographics in the study area, best estimates of the evacuation effectiveness were made for different initiating events and exposure times. For example, for the flood-daytime scenario, it was assumed that if 30 minutes were available between receiving a warning about the imminent flood and the time the floodwaters would reach a particular area, 80 percent of the people in the area would be able to evacuate and move to safe places.

Breach Development Time

For a seismic event, the breach is assumed to develop rapidly over a span of some 15 minutes. The results of the flood routing model show that a rapidly developed breach would result in floodwater rushing out with higher velocity and reaching the boundary of the high flood severity zone quicker. This will reduce the time available to evacuate and increase the potential for a larger number of fatalities. If a longer breach development time (say, 30 minutes) were to be assumed, the time for people to reach the boundary of the high flood severity zone would increase significantly, and would permit more people to evacuate.

12.1.8.1 Estimated Island Population Near the Levees

The available U.S. census database was used to estimate the population in each flood severity zone on each island for a given breach location. The population within each census block was assumed to be uniformly distributed. The actual population may be distributed in a non-uniform manner.

No small-scale digital data of population within each island were available. For some islands, the population on an island could be clustered close to the levee that protects the island from flooding. Such clustering will increase the population exposed to flood risk. Conversely, a significant portion of the population in an island, particularly a large island, could be in the center of the island, away from the flood impact zone. This would decrease the population exposed to the flood risk. Small-scale digital data on island population will be needed to resolve this uncertainty.

12.1.8.2 Main Findings

The main findings of the life-safety analysis are as follows:

- For the flood nighttime scenario, eight islands out of a total of 136 islands have a greater than 10 percent (conditional) probability of 100 or more fatalities given a breach. These islands contain significantly populated areas close to the levee perimeter around the island.

Similarly, for the seismic-nighttime scenario, two islands have greater than a 10 percent (conditional) probability of 100 or more fatalities given a breach.

- For floods, all islands within the 100-year flood plain are assumed to be at risk if a breach were to occur on the levees protecting these islands. For several islands within the 100-year floodplain, populations of several hundred are present within the high severity flood zone (i.e., within 1,000 feet of the levees). With the assumed warning times, about one-third of these people are likely to have insufficient time to evacuate before floodwaters reach their residences.
- For a seismic event, only those islands within the mean higher high water (MHHW) levels are assumed to be at risk. As a result, fewer islands are at risk of flooding from an earthquake-induced breach. On the other hand, such a breach is likely to occur suddenly and would cause floods with high velocity that move quickly across an island. As a result, people residing within the high flood severity zone (which was estimated to be up to 1,000 feet from the levees) would get little warning time about the impending flood. They would not be able to evacuate before the floodwaters arrived.
- Fatality risks are higher during a nighttime breach because it would take longer to detect such a breach and the warning issuance time is likely to be longer, which would reduce the time available to evacuate.
- Fatality risks from a breach during sunny-day conditions are relatively small. This is because only islands within the MHHW levels are assumed to be at risk and there is likely be sufficient warning time for people to evacuate. This result is consistent with the experience from the 2004 Jones Tract levee breach.
- The estimated fatality risks are sensitive to the data available to delineate the spatial distribution of the population within the high flood severity zones and to the key risk model parameters. Best estimates of the key parameters were made based on available data and professional judgment. The sensitivity of results to these parameters was discussed previously in this section. The uncertainty in the key model parameters and the sensitivity of results to the variations in these parameters suggest that the uncertainty factor in the estimated fatality risks could be on the order of 2 to 5. That is, the probability of exceeding a given number of fatalities could be higher or lower by a factor of 2 to 5.

12.2 CHANGES IN WATER QUALITY

12.2.1 Risk Modeling for Effects on Water Quality of Exports

12.2.1.1 Salinity

One or more Delta levee breaches that result in island flooding will impact Delta water quality (most obviously salinity) and water operations. A substantial amount of saline water may be drawn in from the Bay depending on the initial salinity of the river/Delta/Bay system, river inflows at the time of the breach event, and the number, size, and locations of the breaches and flooded islands. Subsequently, salinity may be dispersed and degrade Delta water quality for a prolonged period due to the complex inter-relationship between ongoing Delta inflows, tidal mixing, and the breach repair schedule.

The Water Analysis Module (WAM) simulates direct, water-quality-related consequences of levee breach events in relation to salinity. WAM incorporates initial island flooding, upstream reservoir management response, Delta water operations, water quality (salinity) disruption of Delta irrigation, Delta net losses (or net consumptive water use), hydrodynamics, water quality (initially represented by salinity), and water export (see Water Analysis Module TM [URS/JBA 2007e]). The module is central to the risk analysis, receiving the description of each breach scenario (e.g., resulting from a seismic or other event) and details of the levee repair process from the emergency response and repair part of the analysis. The model produces hydrodynamic, water quality, and water supply consequences for use in the economic and ecosystem modules. Water quality consequences of levee failures in the Delta are dependent, not only on the initial state of the Delta at the time of failure, but also on the time series of tides, inflows, exports, other uses, and on the water management decisions that influence these factors. Thus, WAM tracks water management and the Delta's water quality response starting before the initial breach event and proceeding through the breach, emergency operations, repair, and recovery period (see Section 11).

12.2.1.2 Organic Carbon

When subsided Delta islands flood due to a levee breach, significant amounts of organic carbon will be released from the high organic matter soils. Depending on the location of the flooded island, the timing of the pump out of the flood waters and the hydrodynamics and transport at the time of pump out, these elevated levels of organic carbon could adversely affect the drinking water supply derived from the Delta. Dissolved organic carbon reacts with disinfectants during the drinking water treatment process to produce disinfection byproducts, which may be carcinogenic and mutagenic. This impact will be dependent on which islands flood, their proximity to drinking water intakes, and the hydrodynamic conditions governing transport.

A preliminary analysis of total organic carbon (TOC) increases was conducted for six specific Delta levee breach scenarios. These scenarios also include variations in water year type and seasonality. The mass of TOC produced from the flooded peat islands as well as the increases in TOC concentrations at Clifton Court Forebay were modeled for the time period when salinity was restored enough to allow water exports to resume. Drinking water can be reliably treated with enhanced coagulation in the 1 and 3 flooded islands scenarios evaluated, and in one of the 10 flooded islands scenarios. More substantial problems occur in the 20 and 30 flooded island scenarios. With sustained TOC concentrations greater than 6 mg/L, the Delta water may not be usable for municipal and industrial purposes; however, it may be suitable for agriculture. More details on TOC impacts on water treatment are provided in Appendix 12E. Decisions must then be made regarding water exports that impact potability in downstream reservoirs, storage, and drinking water treatment facilities.

More detailed modeling and an evaluation of dewatering locations and rates can be used to refine the predicted magnitude and duration of spikes. However, additional treatment options would be needed to address periods when TOC concentrations are above 6 mg/L.

12.2.2 Qualitative

Levee failure and the resultant re-suspension of sediment and sediment associated pollutants, as well as damage to pipelines and hazardous material storage containers, is expected to adversely affect water quality and may result in stress or mortality to fish and other organisms. The severity of water quality degradation varies in response to a number of factors including the quantities of pollutants, the amount of dilution, and frequency of flushing flows.

Pollutants often have direct and negative effects to aquatic organisms. The severity of the effects is often dependent on the duration of exposure, the sensitivity of the species, and lifestage of the organism. Some pollutants can be taken up into tissues and bioconcentrate in specific organs and biomagnify in subsequent trophic levels. The following are a few examples of the effects of toxic substances on aquatic organisms.

- Excessive amount of suspended material in water reduces the amount of sunlight that reaches river and streambeds. Submerged aquatic plants can be affected by the lack of sufficient sunlight. Sedimentation can reduce the carrying capacity in streams, reduce the habitat size for fish, and can increase stress in adult fish. Clay and silt particles can harm fish by clogging gills or smothering larvae. Other pollutants like fertilizers, pesticides, and metals are often attached to the soil particles.
- Metals may adsorb strongly to clays, muds, humic, and organic materials, however they can also be very mobile in the environment. Depending upon the pH, hardness, salinity, oxidation state of the element, soil saturation, and other factors, metals are readily soluble (EPA 2008a).
  - Cadmium is cancer-causing and teratogenic and potentially mutation-causing with severe sublethal and lethal effects at low environmental concentrations. It accumulates in the livers and kidneys of fish.
  - Chromium has a wide range of adverse effects in aquatic organisms such as algae, benthic invertebrates, and embryos and fingerlings of freshwater fish and amphibians.
  - Copper toxicity to fish can occur through rapid binding of copper to the gill membrane, which cause damage and interferes with osmoregulatory processes.
  - Lead may cause muscular and neurological degeneration and destruction, growth inhibition, mortality, reproductive problems, and paralysis in fish. In invertebrates, lead can adversely affect reproduction. In algae, growth may be affected.
  - Selenium undergoes biomagnification as trophic levels increase. Aquatic organisms can experience loss of equilibrium and other neurological disorders, liver damage, reproductive failure, reduced growth, reduced movement rate, chromosomal aberrations, reduced hemoglobin and increased white blood cell count, and necrosis of the ovaries.
- Pesticides include insecticides, herbicides, and fungicides and are designed to prevent, deter, or exterminate pests. Each pesticide has certain risks for aquatic organisms because they are, by design, meant to disrupt biological processes. Organophosphates, such as chlorpyrifos and diazinon, can affect the nervous system. Organophosphates can impact the distribution and abundance of aquatic species. Organochlorines can bioaccumulate in fish tissue. Pyrethroids are synthetic versions of a naturally occurring pesticide in chrysanthemums, and some forms can be extremely toxic to the nervous systems of fish and invertebrates (DWR 2005a).

- Ammonia toxicity causes reduced growth, development, and reproductive rates. There can be injury to gill, liver, and kidney tissues. At moderate ammonia levels, fish can suffer a loss of equilibrium, become hyper-excited, which increases respiratory activity, oxygen uptake, and heart rate. High ammonia concentrations can lead to convulsions, coma, and death.
- Phosphorus compounds typically found in nature are not directly toxic to plants or aquatic species; however, surface waters with high phosphorus levels can exhibit eutrophication, increased growth of undesirable algae and aquatic weeds, and a decrease in dissolved oxygen.

12.2.2.1 Potential Contaminants on Delta Islands

Levee failure could inundate islands that have a variety of land uses such as irrigated and non-irrigated agriculture (cultivated croplands and pasture land with associated farm equipment, farm buildings, and isolated residential structures), small unincorporated communities, industrial areas, recreation areas, and wildlife areas or nature preserves. Larger communities and heavy industrial areas in the Delta are typically located above the 100-year flood plain, and are less likely to be inundated in the event of levee failure. Pollutants associated with areas of potential inundation may be mobilized directly by water or indirectly by soil erosion. These toxics can degrade water quality and can adversely impact the aquatic community as well as humans and wildlife that consume the affected species.

The mobility of these pollutants is influenced by the hydrodynamics of the breached island and by the specific chemical properties of each compound. A chemical constituent might be miscible with water or sorbed to soil particles or display a behavior in between. The toxics that could be associated with soil particles include legacy pollutants such as organochlorine pesticides (e.g., DDT, chlordane, or dieldrin), PCBs, dioxins/furans and mercury; organophosphorus pesticides, such as chlorpyrifos and diazinon; pyrethoid insecticides; herbicides; and other organics. The soil may also have elevated concentrations of nutrients (nitrate, nitrite, ammonia, organic nitrogen, and phosphorus), salts, metals (cadmium, copper, lead, nickel, zinc, and selenium) and bacteria or pathogens which may have deleterious effects in the aquatic environment (Barrios 2000; Connor et al. 2004; Oros and Werner 2005). Other effects from Delta island inundation could include the decrease in dissolved oxygen levels, an increase in turbidity, and an increase in sediment accumulation.

Although the specific type and quantity of chemical pollutants located on the islands are unknown, there may be a correlation between pollutant type and land use. Typical agricultural residues would include organic carbon compounds, nutrients, pesticides, herbicides, trace elements, salts, and petroleum compounds. These residues can be on the soil, in farm equipment, or in storage containers. Urban and industrial areas could potentially contribute pesticides, oil, grease, petroleum, heavy metals (including cadmium, copper, lead, nickel, zinc, and mercury), polynuclear aromatic hydrocarbons, nutrients, and pathogens. Boat repair facilities may contribute paint, paint chips, and metals including copper, zinc, and tributyltin. If residential structures in either agricultural areas or small communities were inundated then additional pollutants could be released. Organic material, bacteria, and potential pathogens could be mobilized from sewage treatment systems, on-site septic systems, and leach fields (Delta Protection Commission 2002).

The increase in the concentration of many of these chemical constituents can have a deleterious effect on aquatic life. There is also a potential for additive and synergistic toxicity effects between pesticides or between pesticides and other water quality parameters (Lee and Jones-Lee 2005).

The Delta also contains extensive oil and gas wells and production fields (see Section 11.7). Although there are safeguards and controls on toxic material storage containers and oil and gas extraction wells, these controls are not necessarily designed for an extended submergence after a period of stress. One island in the 100 year flood plain, Rough and Ready Island, contains a federal superfund site; Rough and Ready Island was not one of the islands expected to breach.

As a consequence of the number of variables and unknowns affecting the exposure and fate of organisms from pollutants, and the high degree of uncertainty in the accuracy of predictions of environmental risk associated with contaminant exposure, the release of toxic substances is acknowledged as an environmental stressor, both incrementally and cumulatively, with levee failure but these effects have not been quantified as part of this analysis.

12.2.2.2 Methylation of Mercury

The soils in the Delta generally have elevated levels of mercury due to historic inputs from mercury and gold mining during the gold rush period. Methylmercury is the form of biologically active mercury that can bioaccumulate and biomagnify in the food chain. The flooding of subsided Delta Islands due to a levee breach will result in conditions conducive to methylation of mercury, at least during some of the flooding stages. Mercury methylation may occur when the soils are flooded and oxygen is consumed. The presence of high levels of dissolved organic carbon will facilitate the methylation process. Mercury methylation has been shown to occur when dry soils are initially flooded, the so called “reservoir effect.” It is anticipated that initial wetting during flooding will produce methylmercury and further wetting and drying cycles will promote methylmercury production.

Of particular concern is the availability of methylmercury to phytoplankton during an algal bloom. This will provide a known pathway for bioaccumulation and biomagnifications of methylmercury up the food chain. A more detailed evaluation can be used to investigate potential ecosystem and human effects with respect to the pump out of water from the flooded island that may contains elevated methylmercury.

12.2.2.3 Nutrients

The flooding of islands will release substantial amounts of nutrients into the water column from the very fertile high organic matter soils. When the suspended sediments clear from the water column, light penetration in combination with the increased nutrients may promote algal blooms. A positive aspect of nutrients and organic carbon is the supply of potential food to the ecological food web. Nutrients and particulate organic carbon can provide a source of food and energy to the food web.

12.3 ECOSYSTEM IMPACTS

Ecosystem impacts are another type of consequence of levee failure that is recognized as extremely important, but is also very difficult to analyze quantitatively. Analysis of the impacts of levee breaches on species of fish ("Aquatics"), aquatic and terrestrial vascular plants ("Terrestrial Vegetation"), and birds and mammals ("Terrestrial Wildlife") began with creating conceptual models of the mechanisms through which impacts can occur. Species and groups were selected based on their status as endangered, threatened or species of concern, or because of their important contributions to biodiversity or ecosystem processes. The detailed body of information on key parameters and mechanisms of impact used in the risk analysis are described in the Impact to Ecosystem TM (URS/JBA 2008e). Some of these mechanisms were quantitatively modeled in the risk assessment, others were quantitatively described in the Impact to Ecosystem TM, and others could only be assessed qualitatively.

The risk assessment model for fish incorporates the spatial and temporal distribution of fish species and life history stages (see Figure 12–12 for fish sampling locations), direct mortality and changes in available habitat and its suitability due to levee breaches and the impact of water management operations. Impact models were developed to represent these mechanisms and to estimate the relative change in population and the likelihood of species survival. A similar model was created for terrestrial vegetation and for assessing the impact of levee breaches and repair work on sensitive species of vegetation on the channel side of levees. The risk assessment model of terrestrial vegetation presented in this report uses area of habitat flooded to quantify the primary impact of levee breaching on vegetation types, incorporating the spatial distribution and size of area of vegetation groups and the islands flooded (see Figure 12-13a for example of distribution of vegetation types in the northern Delta, Figure 12-13b for vegetation types in the southern Delta, and Figure 12-13c for vegetation types in Suisun Marsh). The risk assessment model for terrestrial wildlife assesses habitat lost to flooding by incorporating the home range of select sensitive species, the vegetation types utilized by sensitive species, the spatial distribution and area of those vegetation types, and the islands flooded.

It is important to recognize the limitations inherent in this characterization of ecosystem impacts. The results presented here primarily assess the number of individuals or areas of habitat impacted, which is similar to the coarse scale used to evaluate the impact of levee failure on life and safety through measuring the number of residents exposed to flooding. Therefore, these results provide a sense of the order of magnitude of the risk, primarily for the immediate impacts of levee breaches which last for a relatively short duration but cause widespread mortality during the time that they are in operation. Further consequences such as impacts of toxics released, impacts extending across food chains, long-term impacts of levee breach on organisms and the nonlinear impacts of multiple mechanisms of impacts on organisms, are examples of further impacts of levee breaches which are not quantitatively assessed here, but which may have far-reaching impacts on the ecosystem.

The Delta and Suisun Marsh provide habitat for a diverse assemblage of fish and macroinvertebrates, submerged and emergent aquatic vegetation, diverse plant communities, and a variety of birds, mammals, and insects. Levee failures within the Delta or Suisun Marsh have the potential to affect fish and wildlife species directly (e.g., mortality to individual fish entrained onto a flooded island, removal of vegetation during a levee break or as a result of levee reconstruction) or indirectly (e.g., changes in the amount or quality of habitat, water quality, or changes in upstream water releases and diversions from the Delta). Some effects may occur over a relatively short time frame of days to months (e.g., removal of plants by scour) while others may occur over longer time frames such as years to decades (high-salinity water alters the soil structure reducing the capacity of the soil to support upland vegetation). Changes in habitat conditions may be detrimental to some species or lifestages and beneficial to others; in particular young lifestages typically have more limited tolerance ranges than adults. Additionally, changes may have different effects depending on the geographic location and extent of the change, and the timing and duration of the occurrence. Existing data were used to create conceptual models (see Impact to Ecosystem TM [URS/JBA 2008e]) of the mechanisms by which levee failures could affect selected aquatic (see Figure 12–14 for aquatics conceptual model) and terrestrial species (see Figure 12–15 for vegetation conceptual model). The conceptual models were used to identify the key parameters and functional relationships. All of these parameters and relationships were considered when creating the risk assessment, even though not all parameters were explicitly modeled in the risk assessment presented here. Parameters were addressed in one of three ways: (1) they were utilized in the risk model, (2) they were discussed in the Impact to Ecosystem TM but not addressed but was recommended for refinement, or (3) they can only be assessed qualitatively.

The risk assessment models included the following key parameters and functional relationships:

- Parameters in risk model used to assess the impact of levee breaches on Aquatics
  - Breach duration
  - Number of breaches
  - Salinity or X_2 location
  - Coldwater pool and species tolerance
  - Entrainment onto Islands
  - Entrainment into SWP/CVP pumps
  - Species and lifestages location in space and time
- Parameters in risk model used to assess the impact of levee breaches on terrestrial vegetation
  - Location of breached islands
  - Spatial distribution of species
- Parameters in risk model used to assess the impact of levee breaches on terrestrial wildlife
  - Location of breached islands
  - Home range of species
  - Vegetation types utilized as habitat by species

Key parameters, functional relationships, and ecosystem impacts of levee breaches are summarized below. For more details on model development, input parameters, and the results of the analyses, see the Impact to Ecosystem TM (URS/JBA 2008e).

12.3.1 Aquatic Species

12.3.1.1 Foreword

The Impact to Ecosystem TM was revised after the CALFED Science Program Independent Review Panel (IRP) provided its review comments on August 23, 2007. The review comments were particularly critical of the aquatic impact model. Specifically, the comments indicated that the model lacked clarity and robustness. The review panel recommended that the DRMS ecosystem team uses a simpler approach and suggested the use of an expert elicitation process to develop the new aquatic impact model.

The new aquatic impact model presented in the Impact to Ecosystem TM (URS/JBA 2008e) was developed using input from the experts. However, the model application and execution has not been completed because the experts had limited availability during the time frame required to complete the work. The other two models used in the Impact to Ecosystem TM (the vegetation and terrestrial species impact models) were kept about the same. The overall TM was edited and updated in accordance with the IRP comments.

The experts convened for the elicitation process were:

- Dr. Wim Kimmerer (UCSF, Romberg Tiburon Center for Environmental Studies)
- Dr. William Bennett (UC Davis)
- Dr. Peter Moyle (UC Davis)
- Dr. Chuck Hanson (Hanson Environmental, Inc.)

The development of the aquatic impact model relied on input and recommendations from these experts. The approach was phased. The experts reviewed the general elements of potential impact mechanisms to assess their relevance to the particular application in DRMS (ecosystem impacts as a result of levee failures). Then, each relevant mechanism or its subset was developed separately and presented to the experts in a formal meeting-elicitation session for review and comments. Because of the limited availability of the experts to convene more frequently and the schedule constraint to complete the DRMS Phase 1 work, the aquatic model was not fully executed and implemented. Currently, the model has been developed and discussed with the experts and is presented in the Impact to Ecosystem TM (URS/JBA 2008e). The test runs and the production runs have not yet been performed.

12.3.1.2 Assessing Sources of Uncertainty and Limits of Knowledge

The purpose of the DRMS risk analysis is to estimate the likelihood of adverse consequences that may occur as a result of levee failures. This analysis includes the effects of levee failures on the ecosystem. For each type of consequence that is evaluated, all sources of uncertainty (aleatory and epistemic) that affect the estimate of consequences, conditional on the occurrence of levee failures, can in principle be estimated.

Ecology is not a predictive science because ecological systems are unreplicated, complex, and stochastic (e.g., Mayr 1961). These “complex adaptive systems” (Brown 1995) respond to many, often subtle, and often non-linear forces and their structure and dynamics are not accurately characterized by a reductionist modeling approach (Brown 1995). Because of this complexity and because ecological outcomes are highly dependent on initial conditions (which often are not known or well understood), ecologists are ill-equipped to predict the outcomes of perturbations to ecosystems. As a result, comprehensive quantitative models that predict future population levels of any species after large-scale perturbations are generally unavailable. These limitations are particularly apparent because all but artificial, experimental “ecosystems” are open systems (they are nested entities with arbitrarily defined boundaries) where the composition of interacting entities changes continuously. For example, in the Delta aquatic ecosystem, species composition and the forces affecting species' interactions are constantly changing (e.g., Alpine and Cloern 1992; Matern et al. 2002). Indeed, the Delta aquatic ecosystem is in the midst of a rapid shift in biological diversity (commonly referred to as "pelagic organism decline"); the forces driving this shift are not well-understood (Sommer et al. 2007).

The DRMS ecosystem impact modeling methodology team was tasked with answering a very broad question: What will happen to the Delta after levee failure? Modern ecology cannot address such a broad question quantitatively because there are too many complex interactions, some dominated by non-linear dynamics and interactions that are not well understood even in "isolated" ecosystems (e.g., Werner 1994; Brown 1995). Instead, DRMS ecosystem impact modeling team identified different mechanisms that were expected to produce relatively large impacts to their focal ecosystems (aquatic or terrestrial) as a result of levee failure and island flooding. For each of these mechanisms, the team identified models to estimate the impact to the relevant ecosystems. These models provide "first-order" estimates of major impacts to selected focal organisms in the ecosystems of the Delta. They are based on relationships of focal species to physical characteristics of their environment. Possible biological interactions are innumerable, context-dependent, and poorly understood; thus, modeling of these (potentially important) effects was severely limited.

The ability to estimate the environmental effects of levee failures is limited by our current state-of-knowledge of ecological processes in general, and the impact that significant stressing events such as levee failures may have in particular. Although substantial effort has been made to study and collect data on the species, habitats, and ecological processes in the Delta and Suisun Marsh, the state of knowledge on some subjects is quite limited. Our understanding of the critical attributes of species, habitats, and processes in the estuarine ecosystem is patchy. Although some species have been extensively studied, others have not and little significant or current information is available for them.

As described above, the Delta provides habitat to a diverse assemblage of resident and migratory estuarine organisms. A wide range of habitats, created by the interaction of physical forces (e.g., flow rates, tidal influence, water depth, salinity intrusion, temperature) with different primary producers (that influence both the local energy supply for other trophic levels and the physical structure of the habitat), and human activities (e.g., agriculture, suburban housing, managed diked-wetlands) leads to a geographically complex pattern of species assemblages. Furthermore, many species use the Delta and Suisun Marsh as a migration corridor, while other species are year-round residents that use different habitats throughout their life cycle. This physical, biological, geographical, and temporal complexity makes analysis of biological sampling data challenging. For example, even intensive sampling efforts may fail to capture important associations between species and habitats that happen seasonally or in a particular environment whose location changes seasonally or annually (e.g., based on freshwater outflow). Fortunately, several long-term and intensive fish and wildlife sampling programs such as those conducted by the California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service, California Department of Water Resources (DWR), U.S. Geological Survey, University of California, Davis, and others have created data sets that are valuable for the study of biological trends and relationships within the Delta and Suisun Marsh.

In the Delta, key unknowns that contribute to our epistemic uncertainty for many of the species include (but are not limited to):

- Current or historical population abundance and relationships (e.g., linear, logarithmic) between population indices and actual population abundance
- Basic life history data (e.g., fecundity and mortality rates)
- Physical habitat tolerances and preferences (salinity, temperature, dissolved oxygen, turbidity, and pollutants)
- The strength, extent, and natural variability in biological interactions including predator-prey dynamics, diseases and their epidemiology, and competitive interactions
- Ecosystem carrying capacity, the trends in carrying capacity, and the drivers that produce those limits and trends

The risk analysis of environmental effects resulting from a wide range of potential levee failure events is characterized by a large amount of uncertainty. Uncertainty is associated with interpretation of existing data for a species, the range of individual responses and tolerances, variations in habitat preferences, and other factors related to developing a single response curve that is representative of the species. Other sources of uncertainty include lack of data regarding:

- The manner in which individual effects on species life stages compound or interact to produce overall changes in individuals
- The manner in which changes in individuals lead to changes in population levels of the species
- The manner in which changes in individual species lead to changes in ecosystem-level effects

In general, these and other knowledge gaps extend across species, habitats, and trophic guilds. Uncertainty regarding these factors is less for some species than for others. Further, factors such as population abundance and the strength of density-dependent limits on population growth can only rarely be determined precisely (May 1974).

In addition to the epistemic uncertainty surrounding predictions of ecosystem response to environmental perturbations, predictions of this sort in biological systems are also subject to significant aleatory uncertainty. Chance (aleatory) events play an important role in population dynamics, interactions among species, and other environmental processes. The forces that produce aleatory uncertainty become increasingly important as population abundance decreases (“Allee effects”) (Stephens and Sutherland 1999) or the geographic extent of a critical habitat declines (e.g., Rosenfield 2002). Many of the species and habitats included in the environmental risk analysis component of the DRMS project are small, geographically limited, and endemic or extremely isolated. Thus, aleatory uncertainty is expected to have a relatively large impact on the predictions that will result from this analysis.

In contrast to the state of knowledge regarding the Delta’s aquatic ecosystem, the relationships between the availability of terrestrial species habitats (i.e., extent, connectivity, patch sizes, and quality) and the distribution and abundance of wildlife in the Delta and Suisun Marsh are generally well understood. However, the data necessary to quantify these relationships is often lacking (e.g., the likely effects of a change in food availability on a species distribution, behavior, or abundance).

12.3.1.3 Risk Assessment Model

The aquatic species risk assessment model was developed in three separate components. Time considerations prevented completion and parameterization of these models. To the maximum extent possible, each model component was designed to make use of existing data sets.

The **first model** component estimates direct mortality to aquatic species arising from **entrainment** and elevated **suspended sediment** concentrations on flooding islands. This impact will be negative for any species considered but the magnitude of impact will vary depending on species-sensitivity to suspended sediment concentrations and the proportion of its population that exists in the Delta at the time of levee failure. This model uses data from aquatic community sampling programs in the Delta that to portray the spatial and temporal distribution of focal species (and how that distribution varies with hydrological conditions) and combines it with data on island volume and location to estimate potential entrainment on flooding. The time-course and magnitude of fish entrainment (measured as a proportion of a given species' population) can be integrated with estimates of the time-course and magnitude of suspended sediment concentrations to estimate the likely mortality (and uncertainty surrounding that estimate) for focal species. These results can then be evaluated by estimating the effect of entrainment mortality on the likelihood of population extirpation within a given time frame. A specific model for estimating these impacts is developed and described in the Impact to Ecosystem TM (URS/JBA 2008e, Sections 6.1.1 and 6.1.2).

The **second model** component estimates the mortality that would be *avoided* if levee failures lead to **cessation of export** pumping by the CVP and SWP pumps in the south Delta. This impact will be positive for any species considered but the magnitude of the impact depends on the species' susceptibility to entrainment and mortality at the south Delta pumps under business-as-usual operations. Different approaches to estimating the proportional impact of business-as-usual pumping practices are presented. Such impacts are particular to different species and life stages and change depending on season and hydrological conditions. The relative benefits of curtailed export pumping are evaluated by estimating the effect of averted mortality on the likelihood of population extirpation within a given time frame. This estimate is generated using the same approach as that used for estimating the negative impact of mortality due to entrainment on flooding islands, and is described in the Impact to Ecosystem Technical Memorandum, Sections 6.1.3 and 6.1.4.

The **third model** component assesses the potential for **creation of new habitat** that may be used by aquatic species. Flooded islands with acceptable physical conditions may represent a positive impact for focal aquatic species. But, they may represent a negative impact if "habitat" on flooded islands supports invasive predators or other species that alter the ecosystem in a way that impacts focal species negatively (e.g., invasive submerged aquatic vegetation, invasive clams). Physical habitat conditions on flooded islands can be assessed by the salinities expected on those islands (as predicted by hydrodynamic modeling performed elsewhere in the DRMS modeling context), island depth, water temperatures (predicted from current patterns), and turbidity (also predicted from current patterns). Furthermore, flooded islands that periodically experience extremely low dissolved oxygen concentrations (via eutrophication resulting from biological respiration) may represent "population sinks" for aquatic species that colonize them. Methods for estimating the likelihood of island eutrophication are developed in the Impact to Ecosystem TM (URS/JBA 2008e, Sections 6.1.5 through 6.1.7).

Each of these components addresses the central question: What is the impact of levee-failure (and subsequent flooding of islands) on the aquatic ecosystem? However, each model component operates on a different time scale and utilizes somewhat different data sources. For example, impacts estimated under the third model component (habitat creation) are not comparable to estimates of changes in extinction time resulting from the immediate impacts of island flooding. These models present somewhat independent efforts to characterize impacts to the aquatic ecosystem and it is not possible, scientifically advisable, or necessary to link them in a way that would produce a unified measure of impact.

These three model components are not expected to present a comprehensive view of the ecosystem response to levee-failure. Ecosystems are complex, adaptive systems; the dynamic response to perturbation reflects innumerable processes (many of which cannot currently be modeled), initial conditions (many of which are not known), and a various stochastic effects. Instead, these model components present estimates (to a first order) of major impacts that might be expected to result from levee-failure. They should provide insight into potential major effects of levee failure events (e.g., extinction or local extirpation of one or more species) and the impact of post-failure response strategies (e.g., island recovery priority and timing).

12.3.1.4 Further Refinements

Mortality due to entrainment on flooding islands. Data on species-specific tolerances for suspended sediment concentrations are generally lacking. The best information is available for the family Salmonidae (including Chinook salmon and steelhead); however, even there, the available data presents a very large range of uncertainty. It may be possible to develop estimates of species-specific suspended sediment tolerances through an expert elicitation process; however, targeted research into the tolerances of the species in question would reduce this uncertainty substantially.

Averted entrainment-related mortality due to cessation of CVP/SWP export operations. Estimates of impact to aquatic species related to entrainment in CVP/SWP water export operations incorporate estimates of salvage and pre-entrainment loss at the pumping facilities as well as estimates of a species' total population size in the Delta. Both of these estimates can be improved. The Impact to Ecosystem TM (URS/JBA 2008e) provides several approaches for estimating these parameters, including some of the most recent approaches from experts in this ecosystem.

Not incorporated into this model component are estimates of the mortality to fish species from altered hydrodynamics in the Delta that result from export operations. These impacts, which may divert fish from their preferred habitats or migration paths into inhospitable environments in the inner Delta, may be significant (perhaps larger than the direct impact of entrainment at the pumping facilities), yet there is no estimate of their magnitude. Development of procedures for estimating indirect mortality due to export-related hydrodynamics would allow better estimation of the increase in population likely to result from temporary cessation of export pumping.

Creation of new habitat on flooding islands. Because this component projects impacts that may occur further in the future and those that result from potential biological interactions, the effect of this mechanism is highly uncertain. Still, improved projections of physical habitat conditions on these islands (e.g., temperature and salinity), combined with improved techniques for predicting colonization by invasive species would improve certainty of consequences from this mechanism.

12.3.2 Terrestrial Vegetation

12.3.2.1 Risk Assessment Model

Location of Species Types. Species of vegetation were grouped into 14 functional groups of wild vegetation called “vegetation types.” The location of vegetation types was determined from surveys conducted by DFG (see Figure 12–13a for example of vegetation type distribution in the northern Delta).

Flooding with Saline Water. The combination of salinity and flooding (i.e., flooding with high-salinity water), decreases growth and survival more than either type of stress alone (Figure 12–16) (Kozlowski 1997). Flooding cuts off oxygen supply to the submerged vegetation causing a cascade of responses, and flooding with saltwater causes additional osmotic shock and salt toxicity (Mitsch and Gosselink 1993). However, due to the paucity of information on plant response to flooding with saline water, responses of vegetation to flooding and salinity will be addressed separately (Figure 12-17).

Flooding (Inundation). Flooding shuts off oxygen supply to submerged terrestrial plant parts. Respiration shifts from aerobic to anaerobic, impairing the energy status of cells, and reducing all metabolic activities. In particular, the low energy produced by anaerobic glycolysis in flooded upland plants causes a reduction in nutrient uptake. The toxic end-products of anaerobic glycolysis (fermentation) cause cytoplasmic acidosis and eventually death (Roberts 1988 in Mitsch and Gosselink 1993). Flooding also causes decreased water uptake, resulting in drought-like symptoms of closed stomata and wilting. Flooding not only cuts off the oxygen supply to submerged vegetative tissue, but cuts off oxygen supply to the soil, as well. These anaerobic soil conditions result in an accumulation of substances that have a toxic effect on roots, including by products of anaerobic bacteria, and soluble reducing minerals such as iron, manganese, and sulfur (Kozlowski 1997; Ernst 1990 in Mitsch and Gosselink 1993). Furthermore, infrequent flooding alters the soil structure and capacity of the soil to support plant growth of non-flood tolerant species (Mitsch and Gosselink 1993).

12.3.2.2 Further Refinements

Salinity. Plants adapt to salinity by physiologically tolerating high salt concentrations (e.g., through osmotic adjustment) or avoiding salt (salt extrusion, salt exclusion, or dilution) (Kozlowski 1997). Specialized tissues or organs are involved with avoiding salt, such as the inner cells of the cortex of roots of vascular plants and the passage cells of the steele, which are barriers to transport of salt into the plant. Some plants leak salts through secretory organs, such as salt glands, in which energy is used to selectively move ions from vascular tissue in the leaves (Mitsch and Gosselink 1993). The precise mechanisms through which salinity inhibits growth are complex (Kozlowski 1997). Plants which have adapted to high salinity conditions can often survive in low salinity environments, but due to the energy expended on adaptations for high salinity, are typically out-competed by non salt tolerant plants.

Flowering Time. Flowering time relative to breach events is pertinent for upland plant species but not for wetland or aquatic species. If flooding occurs during the flowering time of a species, then pollination, seed set and fruits may be impacted, reducing the number of seeds in the seed bank for re-colonization after removal of flood water. For many perennial species in the marsh, flowering is intermittent and sexual reproduction through seed production is only favored in times of lowered salinity. Annual reproduction of these plants from seeds is not essential for their long-term survival (SEW 2001).

Lifespans. Lifespans of plant species range from 1 year (annuals), biennials (2 years), and perennials (several to > 200years; USDA 2007). For annual species, reduction of reproductive potential can have a large impact on population size of the subsequent generation; for small populations of annuals increases in variability of population size increases probability of population extinction. Reduction of a reproductive potential for a single year for biennials and perennials will have little long-term impact on the population size, if the adults are able to survive flooded conditions and reproduce in the following years.

Sensitive Species and Loss of Habitat. Sensitive species include those listed as endangered, threatened or species of concern by federal and state entities. Many sensitive species live in the Delta, and the channel-side of the levee provides a refuge for many observed occurrences of sensitive species as well as fringing tidal wetlands. This habitat is lost in the breach cross section when levees breach. During breach repair operations the channel-side of the levee is also impacted by construction equipment approximately 1.5 times the breach width, to either side of the breach. From the Jones tract report, it does not appear that interstitial islands near the breach are lost by water flowing into the breach (pers. comm. S. Salah-Mars 2006); therefore, we assume that habitat on interstitial islands are not affected by proximal levee breaks. Habitat in levee breach scour hole is also lost.

12.3.2.3 Qualitative

Seed Banks. Seed persistence describes the duration that seeds remain viable as well as the speed at which seeds in the seed bank germinate. Seed persistence varies among species, from short seed persistence (e.g., *Avena fatua* seeds do not stay in the seed bank long because they germinate rapidly) to other plant species in which viable seeds can be stored for upwards of 20 years; the upper limit of seed viability is unknown. Viability of seeds is influenced by storage conditions (e.g., levels of moisture and salinity), but little is known about the impact of flooding on seed viability for the range of communities found in the Delta and Suisun Marsh. The ability of seedbanks to re-establish communities is impacted by soil characteristics, salinity, and hydrology (La Peyre et al. 2005).

Vegetative Propagules. Vegetative (non-sexual) reproduction can include growing new plants from stolons, bulbs, cuttings (pieces of a plant), sprigs, rhizomes, or tubers. Some of these modes of vegetative reproduction allow for long distance dispersal of propagules (bulbs, cuttings, sprigs) and others short distance dispersal (daughter plants from stolons, rhizomes, tubers). The tolerance of vegetative structures to flooding and salinity varies. For some plants (e.g., *Egeria*) which can reproduce by cuttings, the scour associated with flooding creates vegetative propagules and spreads them with flood waters. Other vegetative structures, such as *Typha* rhizomes can also break-off and relocate during disturbances such as flood events. For many aquatic and marsh species, reproduction by vegetative propagules has a much larger contribution to population size than seeds; clonal marsh plants including tules or bulrushes (*Scirpus* spp.) have a low rate of establishment from seed, but populations are maintained and spread by clonal rhizomes (Adam 1990).

Sedimentation. Sedimentation can affect post-inundation vegetation recovery by reducing light penetration and decreasing the amplitude of the daily temperature fluctuation (van der Valk 1986), affecting seed germination (Mitsch and Gosselink 1993) and photosynthetic depths. Increasing sediment to 2 cm significantly reduced taxa density and seedling emergence in tidal wetland vegetation (Peterson and Baldwin 2004). In freshwater to brackish wetlands (Canada) seedling emergence is significantly reduced at sedimentation coverage of as little as 1 cm, and larger seeds (e.g., *Hordeum* an upland grass tolerates 5 cm sediment) can emerge from greater soil depth than small seeded vegetation (e.g., *Typha* spp. tolerates 1 cm sediment, but primarily spreads vegetatively) (Galinato and van der Valk 1986).

Disturbance. Disturbance, including scour and sedimental burial accelerates change in community composition upon vegetation recovery (Howard and Mendelssohn 2000). Scour resulting from levee breach also abraids plants creating vegetative propagules from plants which can reproduce vegetatively via floodwaters. Some particularly difficult to eradicate aquatic invasive species (e.g., *Egeria densa,* which propagates solely by vegetative reproduction in North America) can propagate from small pieces of vegetation (e.g., 10 cm *Ludwigia* sp.).

Dampened Tidal Range. Water flowing into breached areas can dampen the tidal range in the entire Delta region, as much as 45 percent in scenarios where large numbers of islands are breached. The tidal range would be restored over the duration of the levee repair operations. Tidal range defines suitable habitat for mid, low, and high marsh communities, and may reduce the total area of marsh habitat in the many pockets of fringing tidal marsh vegetation on the channel-side of Delta levees and islands in channels.

12.3.3 Terrestrial Wildlife

12.3.3.1 Risk Assessment

Wildlife Habitat. Species home range and the vegetation types utilized as habitat were used to determine potential habitat for each species.

Direct Loss of Habitat as a Result of Flooding. Levee breaches on Delta islands could result in loss of agricultural habitats, marsh and riparian habitats associated with island drains and ditches, and herbaceous habitats located at elevations below the flood level. These effects would be temporary on islands that are drained and reclaimed to their former uses. Breaches of dikes in Suisun Marsh would also result in loss of these habitats as a result of the initial inundation after the breach and subsequent tidal inundation.

12.3.3.2 Further refinement

Direct Loss of Levee Habitat due to Failures. Levees support linear habitats that include riparian scrub and woodland (in locations where such vegetation is not periodically removed for levee maintenance), herbaceous vegetation, and emergent vegetation (that may be present along the interior and exterior toes of levees). Levee failures would result in the direct and immediate loss of these habitats at the point of failure. Additional loss could occur as a result of ongoing erosion of the levee breach.

Loss of Habitat as a Result of Changed Hydrology and Salinity. Vegetation type, quality and extent as well as the species associated with specific habitats could change due to altered salinity and hydrology if such changes are of sufficient magnitude to convert one habitat to another. Figure 12–17 shows the tolerance of pondweed to changing physical conditions of water depth, flood duration, and salinity. Prolonged conditions outside these tolerance range will result in species loss.

12.4 ECONOMIC CONSEQUENCES

12.4.1 Measuring Economic Consequences.

Of the four types of consequences, economics has the strongest tradition and discipline for quantitatively estimating the results of a dramatic event such as a major combination of Delta levee breaches. With this tradition and discipline come well-defined concepts and analytical procedures. For example, federal projects have very tight rules for conducting cost-benefit analyses while regional and state governments have precise concepts defining the adverse or beneficial impacts to their territories. These conflict with the straightforward interpretation that the public often wants to attach – the public and their political representatives are looking for a single all-encompassing measure (X million or billion dollars). Thus, in assessing economic consequences, substantial attention must be devoted to understanding what the resulting numbers mean. The idea of one all-encompassing, bottom-line number is elusive and likely unachievable.

To begin, economists attach different meanings to "cost" and "impact."

- Economic cost is the potential economic benefit of measures which eliminate flooding. This definition of cost has developed from the guidelines for analyses performed relative to federal flood control projects.
- Economic impacts are measures that people often ask to see – the values of output, employment, labor income and value added that are changed by the flooding event. (Value added is labor income plus property income plus certain business taxes.) However, even these measures can be elusive. For example, if Delta flooding were to prevent harvest of a local asparagus crop, that would have impact on local output, employment, labor income and value added. However, if this shortage of asparagus caused prices to rise and Imperial Valley farm income to increase substantially, the adverse impact might be counterbalanced by a benefit when considering the state as a whole.

In summary, the economic costs are the net costs to the state economy without any consideration of who within the state bears that cost. All economic costs are generally additive. Economic impacts include a variety of other economic measures. For this study, four measures of economic impacts were evaluated. These were value of lost output, lost jobs, lost labor income, and lost value added. These measures are not additive with each other, and they should not be added to economic costs. Value added is the sum of wages and salaries, proprietors' incomes, other property income, and indirect business taxes.

So, economic estimates relative to levee breach events are developed with very carefully defined points of view and precise meanings. It is easy to misinterpret the numbers or to believe they include consequences that they do not. In the levee failure case, there may be some winners as well as losers. For example, if a railroad fails as a result of a levee breach, the railroad will lose revenues, and truck drivers that transport the goods instead will gain income. The net costs to the state as a whole will be limited to the additional costs that result from the use of road transport rather than rail. It should be noted that economic impacts do not reflect potential legal costs to the state that might arise if the state were held liable for losses due to levee failure.

Finally, although the approaches for assessing economic consequences are relatively well developed, they do not cover all the effects that stem from a major incident. The stark contrast between numbers mentioned after hurricane Katrina for the actual consequences of the event compared with estimates that had been made in studies before the event is a reminder that economics is an imprecise forecasting science.

The following economic consequences analyses are reported:

- Economic costs
  - Repair and recovery costs
  - Direct flooding damage to infrastructure
  - In-Delta lost use economic costs
  - In-Delta and water export lost use economic costs
  - Other statewide economic costs
- Economic impacts

The following subsections provide more detailed summaries of the Ecosystem and Economic consequences analyses performed.

12.4.2 Economic Costs

12.4.2.1 Repair and Recovery Costs

The Emergency Response and Repair (ER&R) model estimates the time and material required, and the associated costs, to stabilize damaged levee sections, prevent further damage, close breaches, and dewater flooded islands after levee failure(s). The ER&R model must be applicable for the range of events/sequences that will be modeled in the DRMS study, while also considering the effect on emergency response capability resulting from flood fighting activities during the winter months.

Given a sequence that identifies a set of levee breaches and/or damage throughout the Delta, the ER&R model makes an assessment of the ability to respond. The assessment will address the following factors key to estimating the amount of time required for achieving a return to normal operations (i.e., normal water export):

- Prevention of continuing damage (remediation of damaged sections of levee, capping of breached levee ends, and interior levee protection)
- Breach closure
- Dewatering of flooded islands

The emergency response and repair module was developed as a simulation model, using the simulation software package Extend™, which is an industry-standard, general-purpose simulation tool that can be used to model a large variety of processes. Extend is a powerful object-oriented simulation tool that uses the MOD-L programming language. This tool has been employed on many projects that required probabilistic assessment to determine the risk/probability of outcomes.

The model employs Extend's capability of combining discrete event simulation with continuous simulation flow architecture. In the discrete event simulation items are generated, each item representing a specific repair that must be carried out for the particular sequence being analyzed. The number of items required for a particular sequence depends on the number of individual breaches and damaged sections on the affected islands plus all eight levee segments on flooded islands that are susceptible to interior slope erosion, and the repair work order that has been specified for that sequence. The flow architecture in Extend is used to model the production rates, which represent the combination of production capacity of the quarries and transportation capability.

The Emergency Response and Repair TM (URS/JBA 2008d) provides a detailed discussion of the ER&R model. The analysis considers gross quantities and costs of material required for repairing damage and closing breaches and does not differentiate between material types. The model allows prioritization of levee repairs. As an example of order of magnitude costs, a 3 island failure was evaluated with the model with repair and recovery costs of approximately $100 million.

12.4.2.2 Direct Flooding Damage to Infrastructure

The Impact to Infrastructure TM (URS/JBA 2007f) details the infrastructure analysis. A large amount of infrastructure is located within the Delta and Suisun Marsh. Some of the infrastructure that crosses the Delta to other parts of California provides vital resources such as water, gas, power, communications, shipping, and railroad freight transportation. Levee failure would cause direct physical damage to residential, commercial, recreational, and public assets. Chapter 5 includes more detailed description of the linear and point assets that could be flooded and lists infrastructure that is not included in the asset estimates. Also, although the Delta levees themselves are assets, they are not considered to be infrastructure assets in this section, but are included in the repair and recovery costs in Section 12.4.2.

Since any combination of islands and tracts could be inundated from levee failures, the DRMS evaluations required estimates of the net asset value for each island and tract. Since flooding of an island does not necessarily result in total loss of the assets, an estimate of the percent damage was also required.

The general approach to the work is divided into the following three main parts:

- Data Compilation/Asset Definition:
  - Gather GIS data (quantity and type of assets) for each island including asset attributes.
  - Obtain unit cost data and repair times for the infrastructure assets.
  - Define analysis zones.
- Analysis/Evaluation:

  - Assess potential damage to infrastructure due to stressing events considering flooding depth.
  - Assess uncertainty in infrastructure repair cost estimates.
- Summary of Results/Technical Memorandum:
  - Summarize analysis results due to the stressing events.
  - Prepare a technical memorandum on damage assessment potential on Delta infrastructure.

The analysis was conducted for inundation from levee breaching from two different flood stage conditions. The first accounted for asset value and damage for areas that could be inundated when the tide was at MHHW. The second accounted for asset value and damage for areas that could be inundated during a 100-year flood event. The amount of infrastructure that could be damaged during the 100-year flood is significantly larger than the infrastructure that could be damaged at MHHW. The analysis for MHHW includes only the infrastructure that is below approximately the 5-foot contour. The flood stages for the 100-year flood exceed 20 feet in some areas near the fringes of the study area.

The damage analysis also includes infrastructure that could be in the direct line of scour at a levee breach. Past levee failures have shown scour holes on the islands where high velocity water passes through the levee breach. From these historical data, the scour holes were assumed to be 2,000 feet long (perpendicular to the island perimeter/levee). As such, the areas of islands that would be vulnerable to scour extend 2,000 feet inboard of and parallel to the island levees/perimeters.

Scour due to levee breaching is included in the inundation events (i.e., scour of levee is followed by inundation/flooding of an island). The potential scour zones for the Delta islands are shown on Figure 5-12 (see Section 5.5), together with the MHHW and 100-year flood plain limits. Assets that are within the scour zones are assumed to be destroyed. Therefore, the repair costs would equal the replacement costs within the scour zones. The repair costs due to scour damage are treated as incremental costs that are added to the cost of repair from inundation to obtain the total cost of repair.

The cost for repairs due to multiple island failures is likely to be more than for a few island failures due to many complexities such as material shortages and gaining access. For multiple island failures (up to 30), scaling factors are applied to the estimated costs. The assumed linear cost scaling factors (for both point and linear assets) that would be applied to more than five island failures follow:

- 1 to 5 island failures: 1.0
- 10 island failures: 1.2
- 20 island failures: 1.6
- 30 island failures: 2.0

The asset values and damage estimates are shown in the following three tables (at end of section): Table 12–6 for MHHW, Table 12–7 for the 100-year flood, and Table 12–8 for scour during the 100-year flood. Figure 12–18 shows a map of islands within the MHHW boundary;

these islands were included in estimating economic consequences of failures under seismic and normal (“sunny-day”) events. Figure 12–18 also shows the islands within the 100-year flood boundary; these islands were included in estimating economic consequences of failures under flood events.

The costs for rebuilding are estimated at replacement cost, plus the scaling factors. This reflects the fact that rebuilding under conditions of widespread emergency causes materials and labor shortages that drive up the cost of reconstruction. This is developed to reflect the cost of rebuilding the asset stock that would be damaged. However, this is not an estimate of the economic value of the assets lost, or economic cost, required by the USACE in its cost-benefit analyses. To develop an estimate economic cost, two steps are required to adjust the replacement cost estimates presented in this report:

- The scaling factors used to estimate rebuilding costs under multi-island emergencies would need to be removed.
- An additional deflation factor would be used to reflect the fact that the existing asset stock is depreciated, and not worth as much as the new assets that would result from rebuilding.

These steps have not been taken in this report. The scaling factors used are known, but the appropriate deflation factors have not been estimated. When required for USACE cost-benefit analyses, the appropriate deflation factors should be estimated and used with the inflation factors and results presented here to develop the appropriate cost measure for cost-benefit analyses.

12.4.2.3 In-Delta Lost Use Economic Costs

The Economic Consequences TM (URS/JBA 2008f) details the economic analysis.

In-Delta costs and impacts include those associated with the following aspects of the Delta and Suisun Marsh:

- Lost use of structures used by residents, businesses and public services in the Delta (for example, loss of use of homes, lost use of business places and loss of government offices)
- In-Delta agricultural losses
- In-Delta recreation losses

The methodology for estimating these costs are shown in the following:

Residential Structures

The residential lost use analysis counts costs and impacts to people living in the areas at the time of the flood event. The economic methodology is based on FEMA (2005a, 2005b). The FEMA method for estimating displacement costs consists of a one time cost of $500 per household if flooded, plus $500 per month per household, plus a monthly cost based on local rental rates. The direct costs are based on information from National Flood Insurance Program claims. Local rental rates are from USDC (2003). The monthly rental cost is $747 per household. HAZUS residential structure data were used to estimate current occupied households.

Under the 2005 MHHW flood condition, the daily residential displacement cost for all analysis zones is $244,000. For the 100-year floodplain, daily costs for all zones would be $3.4 million. These costs do not include the one-time costs of $500 per household which would be spread over the entire duration of lost use. In 2005, these one-time costs total about $2.14 million under the MHHW flood condition and $33 million for the 100-year condition. In 2030, daily costs are about $380,000 per day under the MHHW flood condition and $8.5 million for the 100-year condition, and additional one-time costs are about $3.6 million under the MHHW condition and $91.3 million for the 100-year condition.

Tables in Appendix A of the Economic Consequences TM (URS/JBA 2008f) provide the estimates of the population and household data for named subregions in the study area. The lost use cost estimates are also provided by named subregions for years 2005 and 2030, for subregions in the 100-year flood plain and in under MHHW flooding.

Businesses

Flooded businesses incur costs and impacts beyond the costs of repair and replacement of facilities and inventory. The FEMA methodology (2005b) allows for displacement costs analogous to those for residential costs; a one-time cost when flooded, plus monthly costs based in part on costs for rented space. The FEMA methodology includes lost business income, but lost income should be counted only to the extent that sales will not continue from the rented space. If a business is able to rent space, then some of the time of lost use does not result in lost sales. That is, either the business finds another space and keeps selling, or sales will cease. The economic cost analysis for lost sales assumes that sales stop for the duration of lost use and that businesses do not pay rental costs. The analysis also assumes that a share of the lost sales are captured by other California businesses. This share is determined by regional purchase coefficients from IMPLAN. A summary of impacts per day for all analysis zones is shown in Table 12–9.

Public Services

The FEMA method allows for value of loss of public services to be included. Costs are based on the annual operating budget or revenues, functional downtime, and a continuity premium. For ordinary public services, the value of public services is estimated simply as the cost to provide them. A day of functional downtime is one day with no service or 2 days with 50 percent service, and so on. The data on public offices in the study area included number of employees, but not costs, so data on budgets and employment by state and local government offices in the Sacramento area were collected and analyzed. It is assumed that the average cost of service per employee is $100,000, and the continuity premium of 10 times is applied for police and fire services. Given these assumptions, the costs of lost government services per day of lost use for all affected analysis zones under the 100-year condition is $13.72 million. Most of this cost, 88 percent, is associated with Zone 196, in Sacramento. This zone includes 394 government offices, most of them being state government.

In-Delta Agricultural Losses

DWR estimates there were 405,899 acres of harvested or grazed, irrigated crop acres in the Delta during the 1998–2004 period (DWR 2006e). The annual value of Delta agricultural production over this period averaged $680 million in 2005 dollars, of which 87 percent was associated with crop production and 13 percent with animal husbandry.

A spatial representation of agricultural production within the 100-year flood plain of the Delta was developed from URS, UC Davis, and DWR data sources (DWR 2006e; URS 2006; University of California, Davis 2006). For the analysis zones defined by URS, the dataset includes total agricultural and non-agricultural acres and inundation depths within the 100-year and mean-highest-high flood plains; scour acres; and estimated crop mix. The crop mix of each analysis zone was estimated using the UC Davis and DWR data sources. Crops were aggregated into eight crop groups: (1) alfalfa; (2) field crops; (3) grain; (4) rice; (5) tomato; (6) truck; (7) orchard; and (8) vineyards.

Agricultural losses from flooding of an analysis zone are the sum of (1) scour impacts, (2) permanent crop loss, (3) field cleanup and rehabilitation, and (4) annual production losses.

- Scour Impacts. Scouring was assumed to render land unusable for farming or other uses. Scour impacts were defined as the amount of agricultural acreage lost to scour multiplied by the average agricultural land value for the analysis zone.
- Permanent Crop Loss. Inundation periods lasting 14 or more days were assumed to kill permanent crops. The analysis assumed permanent crops would be reestablished, either on the same acreage or in some other area.
- Field Cleanup and Rehabilitation. An average cost of $235 per acre for clean-up and rehabilitation was assumed (USACE 2002).
- Annual Production Losses. Production losses were estimated for fall/winter and spring/summer flood events using planting/crop loss decision rules.

Loss of net farm income due to annual production losses is the difference between unrealized crop revenue and avoided variable production costs at the time of the flood event. These values were calculated using Delta crop revenue and cost estimates prepared by DWR and monthly distributions of crop production costs and revenues developed for the Sacramento and San Joaquin River Basins Comprehensive Study (DWR 2006e; USACE 2002).

Losses Due to Water Quality Degradation

Farm income losses may occur in Delta analysis zones unaffected by flooding when levee events increase salinity of Delta water used for crop irrigation. All crops do not respond to salinity in a similar manner; some crops produce acceptable yields at much greater soil salinity than others. The baseline assumption is that all crops are yielding at their full potential. Maas and Hoffman (1977) established relationships between yield and crop sensitivity to salinity.

The economics team estimated potential reductions in crop yield for each of eight crops and developed crop income loss tables (see the Economic Consequences TM [URS/JBA 2008f]).

In-Delta Recreation Losses

This section describes the models and data used to estimate losses in consumer surplus, business income, value added, and employment from reductions in delta boating, fishing, and hunting recreation caused by Delta levee failure. Models for boating and fishing recreation within Delta recreation zones defined by the Delta Protection Commission and for hunting, fishing, and wildlife viewing within Suisun Marsh are presented.

- **Delta Boating/Fishing Impacts.** Damage to Delta levees may require parts of the Delta to be shut down to boating/fishing recreation for public safety or to facilitate repairs. Flooding may also destroy recreation infrastructure in the Delta, such as marinas, boat launches, and fishing access points. The flooded island model calculates lost visitor-days, consumer surplus, and economic impacts as a function of the list of islands flooded by a levee event and the duration each island is out of service.

- **Suisun Marsh Hunting/Wildlife Viewing Impacts.** Flooding within Suisun Marsh impacts recreation primarily by disrupting or closing roads used by marsh visitors to get to its recreation sites. Fishing and boating in the Marsh could also be disrupted by levee breaks in that area. However, we do not have any information as to the size and importance of that activity independent of the activity in the Delta. The losses to Suisun Marsh boating and fishing activity is included in this analysis only to the extent that it is included in the DPR survey of Delta boating and fishing.

The Economics Consequences TM (URS/JBA 2008f) provides data on visitor-days by geographic and monthly distributions. Estimates of consumer surplus developed by other studies are also reported. These estimates were used to develop the economic costs of lost recreation.

12.4.2.4 In-Delta Water Export Lost Use Economic Costs

Water export economic impacts include the potential cost for disruption of water supplies that transit the Delta, including water delivered by the State Water Project (SWP), Central Valley Project (CVP) and the conveyance facilities crossing the Delta (Mokelumne Aqueduct). These include consequences to agriculture and consequences to urban users. The Economic Consequences TM (URS/JBA 2008f) provides detailed information on the analysis and the results.

Water Supplies to Agriculture

In cases where SOD, CVP, and SWP deliveries are reduced, growers and districts will adjust operations to minimize income losses. In regions with developed groundwater pumping capacity, growers and districts will substitute groundwater subject to physical and economic limits. In some cases, groundwater substitution will eliminate the shortage. In other cases, the shortage will remain. In these cases, available water supply will be rationed. The rationing is assumed to allocate available water first to permanent crops, second to high value row crops, and third to forage and pasture.

Analysis was conducted for the San Felipe Unit of the CVP, Central Coast regions, South Coast regions, and the San Joaquin Valley. The SOD Farm Income Loss Model estimates the change in south of Delta farm income relative to a baseline condition given a temporary reduction in CVP and SWP project water deliveries. The model selects the response combination that maximizes farm income subject to water balance and groundwater pumping capacity constraints. Farm income loss is then calculated as the difference in farm income between the baseline condition and the shortage condition. The SOD Farm Income Loss Model was run over the range of possible starting shortage months, shortage durations, and project water shortage magnitudes to map the model solution spaces for each subregion. Shortage durations were expressed as the number of months that project deliveries to a subregion are below baseline as a result of the levee event.

Information on each agency served was collected and aggregated to CVPM regions, and all analyses were conducted at that level. This was done because there is a considerable body of existing analysis at this level that could be relied on for this study. Table 12–10 identifies the

CVPM regions and the irrigation districts that are included in each. Table 12–11 describes the water supply and crop revenue associated with each region.

Water Supply to Urban Users

The methodology used to estimate the effects of a disruption of Delta export water supplies to urban users required identification of agencies susceptible to the disruption, estimating the levels of shortage by agency, estimating the cost of shortage by agencies, and extrapolating the universe of urban agencies affected. Urban water agencies are required to file an Urban Water Management Plan (UWMP) with the California Department of Water Resources every five years, most recently in 2005. This is required to show the agency's expected demand for water, and supplies expected to meet those requirements over the next twenty to twenty five years. In addition, the agencies are required to show how they could respond to water supply shortages in the event of drought or other supply failure. For those urban agencies whose water supplies are at risk, the recent UWMPs were reviewed to determine how likely the agencies were to be affected by impaired Delta export pumping. A number of southern California agencies were found to use SWP supplies to maintain extensive groundwater basins. These basins had largely recovered from overdraft conditions in the 1960s, and the agencies could be expected to be able to mine water from the basins over an extended SWP outage with very little effect. They are not expected to experience shortages or incur shortage costs. However, there will be costs associated with the reduction in Delta export deliveries. First, the agencies and society as a whole will SAVE the incremental cost of transportation of the water from the Delta – that is, there will be a savings because of the reduced water transport costs. These savings will be more than offset by the increase in pumping costs because the water levels in the aquifers will remain lower than they would otherwise be. This net cost was felt to be small enough compared to the modeling effort necessary to estimate it that it would be best ignored in order to have the time to complete other parts of the analysis. Because of this ability, the situations of these agencies were not explored further. It should be noted that these agencies could not maintain their water supplies during an indefinite closure of the Delta.

Then, a number of smaller agencies were removed from the list of agencies to be analyzed, because the net effect to the state of any shortages for those agencies would be expected to be small. The remaining larger agencies, or agencies expected to be particularly hard-hit were selected for further analysis and the effect on the smaller agencies estimated by extrapolation from the relative sizes of the populations served. Table 12–12 shows the population for each agency potentially affected by Delta levee failures.

The shortage cost by agency analyzed was estimated using the shortage loss function developed for use in DWR's LCPSIM model, as updated for use in the Common Assumptions process to evaluate reservoir storage, as discussed in the Economic Consequences TM (URS/JBA 2008f).

The data needed to develop these cost estimates were obtained from the agencies UWMPs, supplemented in some cases by an additional mail survey. The shortage costs estimated by agency and customer group were multiplied by the appropriate number of acre-feet and summed to get the total shortage cost for agencies analyzed. Key information from the UWMPs and description of the survey are summarized in Appendix E of the Economic Consequences TM (URS/JBA 2008f).

However, the LCPSIM equation has been fitted to estimates that reflect maximum shortages of 30 percent. At shortages of above 45 percent the LCPSIM assumption of protecting commercial and industrial users at the expense of residential users can no longer be maintained. To overcome this problem, it was assumed that if no water supply remained, the economic costs would be equal to the estimate of economic value added in that region under normal circumstances, and the estimates for losses between 45 percent and 100 percent were determined by interpolation. As discussed in the Economic Consequences TM (URS/JBA 2008f), this is likely to be an underestimate of costs to the state.

12.4.2.5 Other Statewide Economic Costs

This section addresses the potential costs from the loss of infrastructure in the Delta that serves a wider area than just the Delta. For example, electric utilities own local assets in the Delta (distribution lines) and also assets of statewide importance (transmission lines). The consequences of levee failure that results in changed operation of reservoirs include the loss of hydroelectric generation and recreation opportunities. The Economic Consequences TM (URS/JBA 2008f) includes the results of the analyses.

Mokelumne Aqueduct

The Mokelumne Aqueduct consists of three pipelines that carry water from the Calaveras watershed across the Delta to EBMUD. The loss of any of these pipelines reduces the ability of EBMUD to provide reliable water service to its consumers. In addition, if the aqueduct is in place it could be used to provide supplementary supplies to CCWD in the event that it was unable to obtain sufficient supplies from the Delta. The economic consequences resulting from failure of this asset is considered as part of the analysis of water supplies to urban users.

Deep Water Shipping Channels

The Ports of Sacramento and Stockton could be closed by a flood event. Additional costs are based on the cost of moving freight by rail instead of by ship. Data on recent tonnage is provided by the California Association of Port Agencies. Recent volume was 0.7 and 2.9 million metric tons in Sacramento and Stockton, respectively (CAPA 2005). The additional transport cost by rail per metric ton is $0.026 (AAR 2005) and it is assumed that freight would move by rail for 40 additional miles. The cost of outage per day is estimated to be $2,085 for Sacramento and $10,157 for Stockton.

Electric Transmission

The analysis of consequences arising from failure of electric transmission assets in the Delta concentrates on the loss of the major 500 kV lines. These lines import power from the Pacific Northwest during the summer months, allowing that more efficient generation to displace less efficient generation in California. As a result, the cost to the state of losing these lines is dependent on whether the lines are out of service over the summer months. An analysis by PG&E reported in the Economic Consequences TM (URS/JBA 2008f) estimated that an outage of these transmission lines would cost the state approximately $10.5 million per line per summer month. Costs were estimated to be negligible at other times of the year. These costs are not expected to change over time, because the differential between marginal summer generation in the Pacific Northwest and California is expected to be maintained for the foreseeable future.

There is a very low probability that failure of the transmission in the Delta could lead to massive transmission failures throughout the Western States, as the resulting instability in the electrical system causes areas to cut off electrical contact with each other to prevent damage to generators.

However, both PG&E and the Western Electricity Coordinating Council (which regulates electric transmission reliability) insist that they have instituted management procedures designed to prevent this occurrence.

Highways

Interstate 5, several important state highways and important county and local roads pass through some of the analysis zones. Flooded highways would require travelers to use alternate routes until floodwaters are removed and roads cleared of debris and repaired. Types of costs associated with this include increased travel time and expense for persons who must use another route, increased congestion on alternative routes, lost trips, and business costs associated with delays. Depending on the roads lost and the time taken for repair, this would likely be a major source of economic costs. Published estimates and results from two models were used to develop an estimated daily cost for combinations of road closures. Recommended daily costs for some likely combinations of closures are shown in Table 12–13.

Natural Gas Transmission and Storage

PG&E operates backbone natural gas transmission and storage within the Delta. The company's largest natural gas storage field is located on MacDonald Island. PG&E operates the storage field by adding gas to storage during summer when demands are lower, and withdrawing gas during peak winter days when demand is highest. This storage is integral to ensuring winter gas supplies to Northern California. On a peak winter day natural gas from this storage location can supply as much as 20 to 25 percent of supplies needed in Northern California. This storage is also used to mitigate variations in natural gas prices, by allowing PG&E to purchase gas when prices are relatively low, and reduce purchases when prices are high.

PG&E has developed redundant pipelines to protect the use of this resource under levee failure scenarios, and has designed the storage field to be operated under water. However, the storage area cannot be readily maintained under water, so with an extended flooding scenario the storage area could be required to close down as equipment required maintenance. Costs of this would be most significant over winter months, with the costs varying according to the severity of winter temperatures. In addition, although PG&E has constructed redundancy in its transmission lines, the multiple lines are located near each other because they travel from the same origin to the same destination, so it is possible that levee scour could destroy both the main and backup transmission line.

If both major transmission lines to the storage facility, or the facility itself were to fail over winter months there could be considerable economic costs that would vary according to the severity of winter temperatures. As reported in the Economic Consequences TM (URS/JBA 2008f), these costs could be as high as a billion dollars under extreme cold, but the expected value is $114.4 million per winter month disrupted.

Oil and Gas Wells

Natural gas production is an important economic activity within the Delta. Most natural gas production is not covered in the business sales analysis because most of the companies that own the gas wells are not located within the analysis zones. In a flood event, owners of the gas wells will shut them off if possible. Wells that cannot be shut off may be permanently lost. For this analysis, it is assumed that wells can be shut off before flooding, and that production can resume after a flooding event.

Economic costs of lost use of wells are estimated as the economic interest on natural gas that can not be produced because wells are shut down. For the 100-year condition this cost would be about $200,000 per day.

Petroleum Products Pipelines

Kinder Morgan Energy Partners (KMEP) owns and/or operates a number of "product" pipelines that cross the Delta. To date we have not identified the location of these pipelines, but we believe they include all or most of the following:

- KMEP Concord to Stockton and Bradshaw 10"/8" pipeline
- KMEP Concord to Sacramento and Rocklin 14" and 12" pipeline (connects to Reno and Chico pipeline systems, and serves the Naval Air Station at Fallon, NV)
- KMEP Concord to Fresno 12" pipeline
- KMEP Concord to Suisun 8" pipeline (serves Travis Air Force Base)
- Navy Concord to Ozol 8" pipeline.

These pipelines are estimated to provide approximately 50 percent of transportation fuels to Northern California, and are a major source of supply to northern Nevada. As can be seen from the list, failure of these pipelines will also be a national security concern because the pipelines provide aviation fuel to these military bases (Schremp 2006).

The pipelines are generally around 4 feet below the soil surface, and have remote electronic valves so they can be shut down fast in times of emergencies. They also have an operating practice of pumping out oil and filling with water if the pipeline site is flooded (Blurton 2006). This keeps the lines weighted to minimize spill in case of rupture. Flooding is not expected to cause failure of the lines, but any lines located in a scour zone should be expected to fail.

The California Energy Commission has developed contingency plans to respond to failure of these pipelines that could result from earthquake. These plans would likely also be activated as a result of pipeline failure due to levee break, and calls for tankers to ship fuel around the Delta to storage fuel depots in the east of the Delta. This would require an extensive fleet of tanker trucks, which may not be available. In addition, the loading docks at the East Bay refineries may have insufficient capacity to meet the state's fuel supply needs (Schremp 2006, 2007). To date we have not ascertained the location of these pipelines, so the economic cost of loss of the pipelines has not yet been estimated.

Railroads

Three major railroads cross the Delta. These railroads carry freight and passenger service. The railroads are described below.

<u>The Union Pacific Railroad from Oakland to Sacramento</u>. This railroad carries both freight and the Capital Corridors passenger service.

<u>The Union Pacific Railroad from Fremont to Stockton.</u> This railroad carries 11 trains per day. Six of these are passenger, and 5 are freight. The freight service ships automobiles from the Fremont NUMMI plant, other automobile, intermodal container freight, and other general freight (Schremp 2006, 2007).

The BNSF Railroad to Stockton. Because of the current law suit related to the flooding of Jones Tract, BNSF lawyers instructed their employees not to respond to questions related to the costs of interruption to railroad service across the Delta. The BNSF railroad to Stockton is a major freight line, so we have assumed that the revenues related to freight shipments on this line are the same as those estimated for the Union Pacific railroad from Oakland to Sacramento.

The economic losses associated with the loss of freight transportation is measured by the increased costs of using a less efficient alternative form of transportation. In this case, it has been assumed that the same freight would travel by truck across the Delta and be loaded on trains either in Stockton or Sacramento. As discussed in the section on petroleum products pipelines, it is not clear whether the necessary number of trucks could be found to meet these requirements.

It is assumed that rail transport would not be interrupted by inundation of an island that the railroad crosses, because these railroads are on embankments that are assumed to be above the water level. However, the railroads are subject to scour damage, and if the railroads are within the scour zone they are assumed to be disrupted. Based on comparisons between trucking and rail costs, the following cost estimates were used per month of disruption. A summary of the estimated losses are included in Table 12–14.

Wastewater Facilities

FEMA (2005b) provides a simple method for calculating costs from loss of wastewater services. $33.50 per capita per day is assumed for complete loss of treatment and $8.50 per day for partial loss of treatment. Data requirements are the number of persons affected and days without service. A summary of the estimated losses are included in Table 12–15.

Changed Reservoir Operations

Levee failures in the Delta may cause a change in upstream reservoir operations, such as releasing water to repel saltwater. This can affect electrical generation/use and recreation.

- **Electricity Generation and Use.** When the operation of the water supply system is interrupted, hydroelectric generation will be changed. For the baseline analyses (with no disruption), WAM could estimate hydroelectric generation and pumping loads for the export projects. For years with disruptions, the WAM could also estimate the hydroelectric generation and pumping loads for the North of Delta storage and for San Luis. The generation and pumping loads at south of Delta facilities other than San Luis could be estimated by extrapolation from the water deliveries south of Delta.

  The power used by agricultural agencies for additional groundwater pumping could be obtained from the San Joaquin agricultural model. Similarly, the power used for additional groundwater pumping, saved from additional treatment, and distribution could be estimated from the urban water supply model, with developed for the Common Assumptions process (CH2M Hill 2006).

- **Recreation.** Re-operation may reduce the amount of water in storage, lower surface water elevations and impair opportunities for surface water recreation. The impact on recreation is estimated by losses in consumer surplus from reductions in reservoir recreation (see the Economic Consequences TM [URS/JBA 2008f]).

12.4.3 Economic Impacts

In addition to measuring economic costs in above sections, the analysis also estimates the economic impacts of the disruption. Economic impacts are measured by value of output, wages and salaries, employment, and value added. Value added consists of wages and salaries, proprietors' income, other property income, and certain business taxes.

The estimates are "total" in that they include reduced economic activity through backwards economic linkages. These linkages represent the purchases by affected businesses and households in the California economy. For example, if field crops are flooded, they will purchase less chemicals, labor and energy for crop production, and these businesses in turn reduce their purchases, and so on.

Economic impacts are counted only when value of output is lost. Value of output is lost in the analysis for one of three reasons: because of water shortage, because Delta recreation and other businesses lose sales, or because Delta agricultural production is lost. Economic impacts that might result from increased costs, from reconstruction activities, or from production delays (natural gas wells) are not counted. These economic impacts would often be positive.

Input-output (I-O) models estimate the effect of backwards trade linkages associated with a direct change in output. The direct loss of sales causes an equal reduction in purchases by these businesses, and the share of these purchases that are from California businesses represent an additional loss of California sales. This effect continues through additional backwards linkages. The total effect is limited by the share of purchases that are imports into California.

I-O uses information on sales and expenditures by industry, including the share of expenditures bought from in-state businesses, to estimate economic multipliers. The multipliers can be used to estimate the total economic impact per dollar of direct output reduction for any industry. For example, the ratio of the total loss of sales to the direct loss is the output multiplier.

IMPLAN is an I-O modeling package and database for 519 industries that can be used to develop an I-O model of any county-level or larger economy. For this analysis, 2004 data for every county in California were used to develop a state I-O database and model. The I-O model provides information on how direct sales losses caused by flooding affect the rest of the state economy through the backwards trade linkages.

IMPLAN provides data on employment, wage and salary income, other income, and value added, and multipliers for these measures can be used to estimate the total effect on these other economic measures. For this analysis, since the ESRI data provides employment in the Delta, the ESRI data are used to estimate that part of the direct employment effect, but IMPLAN multipliers are used to estimate the total employment effect.

Economic Impacts from Direct Effects in the Delta

The economic impacts from lost business sales were discussed above. In summary, business sales in the Delta are lost, but some of these sales are picked up by other businesses in-state. The net direct effect considers this substitution effect. The direct effect on output and employment is based on data in the ESRI database. The IMPLAN multipliers are used to calculate total effects on output, employment, labor income and total value added.

The analysis of output losses for in-Delta agriculture provides the basis for the impact analysis. Output losses occur because of flooding and because of water quality effects. Direct value of output losses are inputs to the I-O analysis. The analysis considers the share of agricultural purchases that would have occurred from businesses that are flooded. That is, output losses that occur because agricultural suppliers are flooded, or because farmers do not buy inputs from them, are not double-counted.

There is no analysis included for natural gas. Little of the cost of natural gas production is for variable inputs, so the reduced gas production during a flood has a minimal effect on expenditures. Furthermore, it has been assumed that the gas production will resume and be recovered later. Therefore, and reduced spending during a flood will be offset by increased spending later.

The analysis of expenditure losses for in-Delta recreation provides the basis for the impact analysis. Direct value of expenditure reductions are inputs to the I-O analysis. The analysis considers the share of expenditure reductions that would have occurred from businesses that are flooded. That is, output losses that occur because marinas, resorts and hotels are flooded, or because recreationalists do not buy inputs from them, are not double-counted.

Economic Impacts from Reduced Water Supply

As part of the analysis of water supply shortages to urban agencies, the level of shortage to urban industries is calculated for agencies in 5 Bay Area counties and 6 counties in Southern California. This was then converted to a percentage reduction in industrial output for each of these agencies, using the model described in the Economic Consequences TM (URS/JBA 2008f).

However, some agencies cross county lines, so where necessary, the populations in those agencies were apportioned between counties. The estimated population within each county that is served by one of the studied agencies was then compared with estimates developed by the Demographic Research Unit of the Department of Finance. The percentage of total county population served by agencies operating within those counties was calculated, and is provided in the Economic Consequences TM (URS/JBA 2008f). These percentages were used to develop a weighted average percentage reduction in county manufacturing output.

The percentage reductions were used in conjunction with the IMPLAN model to develop an estimate of the economic impacts resulting from the urban water supply shortages.

This approach has a number of limitations. First, it assumes that the major regions of economic impact to industry through changes in water supply are felt in the eleven counties that are analyzed. While these counties are the major industrial counties in the state, this will result in an underestimate of the total impacts because we have not included a number of counties with smaller industrial bases. Second, industrial output within a county is assumed spread between the agencies serving those counties according to the population served by each agency. This may be incorrect, because one agency may serve the suburbs of a county, while the other serves the industrial base, but this was the only way to recognize water supply differences within a county.

The economic impacts of losses to agricultural production were also analyzed using the changes in the value of agricultural production and the associated IMPLAN analyses, as described in the Economic Consequences TM (URS/JBA 2008f). These impacts were not identified by county, but were aggregated for the state as a whole.

Tables

Table 12–1 Results of Flood Routing Analysis

Initiating Event	Island Size	Flood Severity Zone	Distance to Boundary of Flood Severity Zone (ft)	Time for Flood to Reach Boundary of Severity Zone (hours)
Flood	Large	High	1,000	1.88
		Medium	1,900	2.12
		Low	>1,900	>2.12
	Small	High	1,000	3.08
		Medium	10,000	3.3
		Low	>10,000	>3.3
Seismic	Large	High	1,000	0.27
		Medium	1,650	0.43
		Low	>1,650	>0.43
	Small	High	1,000	0.29
		Medium	10,000	2
		Low	>10,000	>2
Normal ("Sunny Day")	Large	High	1,000	1.88
		Medium	1,900	2.12
		Low	>1,900	>2.12
	Small	High	1,000	3.08
		Medium	10,000	3.3
		Low	>10,000	>3.3

Table 12–2 Warning Issuance Times

Initiating Event	Exposure Time	Warning Issuance Time from Breach Initiation (hours)
Flood	Daytime	0.1
	Nighttime	0.5
Seismic	Daytime	0.1
	Nighttime	0.5
Normal (“Sunny Day”)	Daytime	0.1
	Nighttime	0.5

Table 12–3 Evacuation Effectiveness

Initiating Event	Exposure Time	Evacuation Time Window (hours)	Evacuation Effectiveness
Flood	Daytime	0	0%
		0.5	80%
		>0.5	100%
	Nighttime	0	0%
		1	80%
		>1	100%
Seismic	Daytime	0	0%
		0.5	80%
		1	90%
		>1	100%
	Nighttime	0	0%
		1	80%
		2	90%
		>2	100%
Normal (“Sunny Day”)	Daytime	0	0%
		0.5	90%
		>0.5	100%
	Nighttime	0	0%
		1	90%
		>1	100%

Table 12–4 Statistical Parameters of Life-Loss Fraction Distribution

Flood Severity Zone	Mean of Life Loss Fraction	Standard Deviation of Life Loss Fraction
High	0.925	0.111
Medium	0.121	0.178
Low	0	0

Table 12–5 Summary of Fatality Risks

Initiating Event	Exposure Time	Islands with ≥10% Probability of 10 or More Fatalities Given a Breach		Islands with ≥10% Probability of 100 or More Fatalities Given a Breach
Flood	Daytime	Boggs_Tract		(None)
		Lincoln_Village_Tract		
		Sacramento_Pocket_Area		
		Sargent_Barnhart_Tract 2		
		Shima_Tract		
		Smith_Tract		
		West Sacramento North		
		Zone 158		
		Zone 185		
Flood	Nighttime	57_124	Sacramento_Pocket_Area	Lincoln_Village_Tract
		Bethel_Island	Sargent_Barnhart_Tract 2	Sacramento_Pocket_Area
		Bishop_Tract	Sherman_Island	Sargent_Barnhart_Tract 2
		Boggs_Tract	Shima_Tract	Shima_Tract
		Elk_Grove 1	Smith_Tract	Smith_Tract
		Kassou_District	West Sacramento North	West Sacramento North
		Lincoln_Village_Tract	Zone 158	Zone 158
		Paradise Junction	Zone 185	Zone 185
		RD 17 (Mossdale)		
		Rio_Blanco_Tract		
Seismic	Daytime	57_124		(None)
		Sargent_Barnhart_Tract 2		
		Sargent_Barnhart_Tract 3		

Table 12–5 Summary of Fatality Risks

Initiating Event	Exposure Time	Islands with ≥10% Probability of 10 or More Fatalities Given a Breach		Islands with ≥10% Probability of 100 or More Fatalities Given a Breach
Seismic	Nighttime	57_124	Sherman_Island	57_124
		Bethel_Island	Shima_Tract	Sargent_Barnhart_Tract 2
		Bishop_Tract	Veale_Tract 1	
		Hotchkiss_Tract 1	Walnut_Grove	
		Libby_McNeil_Tract 1	Wright-Elmwood_Tract	
		Rio_Blanco_Tract	Zone 158	
		Sacramento_Pocket_Area		
		Sargent_Barnhart_Tract 2		
		Sargent_Barnhart_Tract 3		
Normal (“Sunny Day”)	Daytime	(None)		(None)
Normal (“Sunny Day”)	Nighttime	57_124		(None)
		Bethel_Island		
		Bishop_Tract		
		Rio_Blanco_Tract		
		Sacramento_Pocket_Area		
		Sargent_Barnhart_Tract 2		
		Sherman_Island		
		Zone 158		

Table 12–6 Estimate Summary of Asset Cost Damage by Island – Mean Higher High Water (MHHW)

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Bacon_Island	Bacon_Island	20,388	34,664	59
Bethel_Island	Bethel_Island	86,850	181,463	48
Bishop_Tract	Bishop_Tract	2,331	17,749	13
Bixler_Tract	Veale_Tract 1	91	434	21
Bouldin_Island	Bouldin_Island	8,667	21,511	40
Brack_Tract	Brack_Tract	2,275	12,429	18
Bradford_Island	Bradford_Island	8,150	19,003	43
Brannan-Andrus Island	Brannan-Andrus Island	90,424	176,691	51
Browns_Island	Browns_Island	0	0	0
Byron_Tract 1	Byron_Tract 1	17,153	116,612	15
Byron_Tract 2	Byron_Tract 2	1,953	19,612	10
Cache_Haas_Tract 1	Moore Tract 3	3,993	21,273	19
Cache_Haas_Tract 2	Moore Tract 1	913	3,747	24
Canal Ranch	Canal Ranch	1,958	8,294	24
Chipps_Island	Chipps_Island	0	0	0
Clifton Court Forebay Water	Clifton Court Forebay Water	254	3,804	7
Coney_Island	Coney_Island	7,280	14,614	50
Deadhorse Island	Deadhorse Island	86	910	9
Decker_Island	Decker_Island	0	1,536	0
Egbert_Tract	Zone 70	3,243	20,336	16
Elk_Grove 1	Zone 76	63	252	25
Empire_Tract	Empire_Tract	2,871	9,511	30
Fabian_Tract	Fabian_Tract	4,163	24,545	17
Fay Island	Fay Island	6	22	25
Glanville_Tract	Glanville_Tract	1,030	6,040	17
Grand Island	Grand Island	105,758	181,277	58
Hastings_Tract 1	Hastings_Tract 1	0	3	1
Hastings_Tract 2	Hastings_Tract 2	1,905	11,183	17
Holland_Land	Netherlands 5	5,624	22,496	25
Holland_Tract	Holland_Tract	4,845	14,669	33
Honker_Bay_Club	SM-201	37	2,022	2

Table 12–6 Estimate Summary of Asset Cost Damage by Island – Mean Higher High Water (MHHW)

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Hotchkiss_Tract 1	Hotchkiss_Tract 1	27,996	93,520	30
Hotchkiss_Tract 2	Hotchkiss_Tract 2	167	1,119	15
Jersey_Island	Jersey_Island	2,632	24,238	11
Jones_Tract-Upper_and_Lower	Jones_Tract	55,837	498,286	11
King_Island	King_Island	17,605	30,840	57
Libby_McNeil_Tract 1	Pierson District 3	3,444	13,712	25
Libby_McNeil_Tract 2	Pierson District 2	103	858	12
Liberte Island	Liberte Island	1,789	14,599	12
Lincoln_Village_Tract	Sargent_Barnhart_Tract 2	4,696	18,816	25
Lisbon_District	Netherlands 4	1,954	9,571	20
Little Holland Tract	Little Holland Tract	0	0	0
Little_Egbert_Tract	Zone 68	1,275	6,873	19
Lower_Roberts_Island	Roberts_Island 2	299	1,076	28
Mandeville_Island	Mandeville_Island	1,303	5,212	25
McCormack_Williamson_Tract	McCormack_Williamson_Tract	496	3,115	16
McDonald_Tract	McDonald_Tract	14,300	30,780	46
McMullin_Ranch-River_Junction Tract	Zone 161	1,902	7,607	25
Medford_Island	Medford_Island	3,347	7,594	44
Merritt Island	Merritt Island	4,103	15,938	26
Middle_Roberts_Island	Roberts_Island 1	31,348	516,500	6
Netherlands 2	Netherlands 3	23,536	97,516	24
New_Hope_Tract	New_Hope_Tract	8,231	32,642	25
Orwood_Tract	Palm-Orwood South	26,818	236,428	11
Palm_Tract	Palm-Orwood North	5,032	21,108	24
Peter Pocket	Peter Pocket	522	2,451	21
Pico_Naglee_Tract	Zone 126	4,124	20,867	20
Pierson_Tract	Pierson District 1	14,519	55,268	26
Pittsburg	Zone 209	2,381	20,385	12
Prospect_Island	Prospect_Island	368	1,552	24
Quimby_Island	Quimby_Island	84	1,084	8

Table 12–6 Estimate Summary of Asset Cost Damage by Island – Mean Higher High Water (MHHW)

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Rindge_Tract	Rindge_Tract	5,093	18,094	28
Rio_Blanco_Tract	Rio_Blanco_Tract	187	5,065	4
Roberts_Island	Roberts_Island 3	3,687	14,849	25
Rough_and_Ready_Island	Rough_and_Ready_Island	8,733	38,613	23
Ryer Island	Ryer Island	17,229	37,218	46
Sargent_Barnhart_Tract 2	Wright-Elmwood_Tract-Sargent Burnhart Tract	153,101	505,877	30
Sargent_Barnhart_Tract 3	Sargent_Barnhart_Tract 3	751	11,380	7
Schafter-Pintail Tract	SM-131	768	2,873	27
Sherman_Island	Sherman_Island	16,107	110,416	15
Shima_Tract	Shima_Tract	250	7,137	4
Shin_Kee_Tract	Shin_Kee_Tract	74	807	9
Simmons-Wheeler_Island	SM-203	35	168	21
SM-123	SM-123	346	3,522	10
SM-124	SM-124	4,253	210,359	2
SM-132	SM-132	65	175	37
SM-133	SM-133	0	0	0
SM-134	SM-134	0	0	0
SM-198	SM-198	357	2,924	12
SM-199	SM-199	283	1,111	25
SM-202	SM-202	37	177	21
SM-39	SM-39	364	2,011	18
SM-40	SM-40	389	1,556	25
SM-41	SM-41	11	3,595	0
SM-42	SM-42	250	1,754	14
SM-43	SM-43	49	168	29
SM-44	SM-44	532	3,023	18
SM-46	SM-46	117	471	25
SM-47	SM-47	0	0	0
SM-48	SM-48	2,380	25,425	9
SM-49	SM-49	537	2,902	19

Table 12–6 Estimate Summary of Asset Cost Damage by Island – Mean Higher High Water (MHHW)

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
SM-51	SM-51	0	0	0
SM-52	SM-52	181	733	25
SM-53	SM-53	0	27	2
SM-54	SM-54	381	1,549	25
SM-55	SM-55	829	5,024	17
SM-56	SM-56	419	3,405	12
SM-57	SM-57	228	4,466	5
SM-58	SM-58	192	768	25
SM-59	SM-59	130	541	24
SM-60	SM-60	240	4,164	6
SM-84	SM-84	3,555	13,846	26
SM-85-Grizzly_Island	SM-85	2,587	16,371	16
Smith_Tract	Zone 157	20	158	13
Staten_Island	Staten_Island	3,363	20,191	17
Sutter Island	Sutter Island	6,578	22,725	29
Terminous_Tract 1	Terminous_Tract 1	131	2,099	6
Terminous_Tract 2	Terminous_Tract 2	27,276	51,464	53
Terminous_Tract 3	Terminous_Tract 3	173	643	27
Twitchell_Island	Twitchell_Island	6,101	12,106	50
Tyler_Island 2	Tyler_Island 2	13,785	91,184	15
Union_Island 1	Union_Island 1	17,286	110,289	16
Union_Island 4	Union_Island 5	2	8	25
Upper_Roberts_Island	Roberts_Island 4	108	2,024	5
Van_Sickle_Island	Van_Sickle_Island	15,139	100,540	15
Veale_Tract 1	Veale_Tract 2	3,040	13,650	22
Veale_Tract 2	Veale_Tract 3	407	3,674	11
Venice_Island	Venice_Island	3,352	13,288	25
Victoria_Island	Victoria_Island	11,505	45,322	25
Walnut_Grove	Tyler_Island 1	12,759	40,179	32
Water Zone 1	Water Zone 1	24,085	129,190	19
Water Zone 2	Water Zone 2	148,062	1,014,258	15

Table 12–6 Estimate Summary of Asset Cost Damage by Island – Mean Higher High Water (MHHW)

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Water Zone 3	Water Zone 3	5,816	120,130	5
Water Zone 4	Water Zone 4	11,816	102,417	12
Water Zone 5	Water Zone 5	1,579	19,251	8
Webb_Tract	Webb_Tract	114	359	32
Woodward_Island	Woodward_Island	10,280	124,673	8
Wright-Elmwood_Tract	Wright-Elmwood_Tract	890	15,967	6
Yolo_Bypass	Moore Tract 2	49	196	25
Zone 14	Zone 14	0	432	0
Zone 155	Zone 155	0	189	0
Zone 162	Zone 162	312	1,868	17
Zone 186	Zone 186	0	3,283	0
Zone 206	Zone 206	1,984	19,309	10
Zone 207	Zone 207	387	1,948	20
Zone 31	Zone 31	54	430	13
Zone 33	Zone 33	20	163	13
Zone 36	Zone 36	45	277	16
Zone 37	Zone 37	513	2,051	25
Zone 38	Zone 38	146	883	17
Zone 64	Zone 64	49	392	13
Zone 90	Zone 90	1	9	10
Total Replacement Cost	-	-	**5,886,042**	-

Table 12–7 Estimate Summary of Asset Cost Damage by Island – 100-Year Flood

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Bacon_Island	Bacon_Island	20,388	34,664	59
Bethel_Island	Bethel_Island	153,462	181,463	85
Bishop_Tract	Bishop_Tract	36,803	109,573	34
Bixler_Tract	Veale_Tract 1	253	784	32
Boggs_Tract	Zone 159	445,147	1,362,900	33
Bouldin_Island	Bouldin_Island	8,667	21,511	40
Brack_Tract	Brack_Tract	2,480	13,647	18
Bradford_Island	Bradford_Island	8,150	19,003	43
Brannan-Andrus Island	Brannan-Andrus Island	91,685	177,734	52
Browns_Island	Browns_Island	0	0	0
Byron_Tract 1	Byron_Tract 1	34,171	123,431	28
Byron_Tract 2	Byron_Tract 2	3,484	18,316	19
Byron_Tract 3	Byron_Tract 3	8,441	29,094	29
Cache_Haas_Tract 1	Moore Tract 3	12,942	64,279	20
Cache_Haas_Tract 2	Moore Tract 1	1,395	2,958	47
Canal Ranch	Canal Ranch	5,375	15,622	34
Chipps_Island	Chipps_Island	0	0	0
Clifton Court Forebay Water	Clifton Court Forebay Water	660	3,866	17
Coney_Island	Coney_Island	14,614	14,614	100
Deadhorse Island	Deadhorse Island	176	910	19
Decker_Island	Decker_Island	0	1,536	0
Discovery_Bay	Discovery_Bay	327,043	764,058	43
Egbert_Tract	Zone 70	6,549	32,639	20
Elk_Grove 1	Zone 76	367,526	908,302	40
Empire_Tract	Empire_Tract	2,871	9,511	30
Fabian_Tract	Fabian_Tract	10,832	33,364	32
Fay Island	Fay Island	6	22	25
Glanville_Tract	Glanville_Tract	12,962	49,828	26
Gliole_District	Netherlands 2	1,967	7,269	27
Grand Island	Grand Island	118,111	181,275	65
Hastings_Tract 2	Hastings_Tract 2	3,803	12,463	31

Table 12–7 Estimate Summary of Asset Cost Damage by Island – 100-Year Flood

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Holland_Land	Netherlands 5	1,019	3,541	29
Holland_Tract	Holland_Tract	5,345	14,669	36
Honker_Bay_Club	SM-201	66	2,020	3
Hotchkiss_Tract 1	Hotchkiss_Tract 1	34,377	94,633	36
Hotchkiss_Tract 2	Hotchkiss_Tract 2	219	1,326	17
Jersey_Island	Jersey_Island	2,632	24,238	11
Jones_Tract-Upper_and_Lower	Jones_Tract	65,972	497,784	13
Kasson_District	Zone 121	1,084	5,088	21
King_Island	King_Island	21,155	30,840	69
Libby_McNeil_Tract 1	Pierson District 3	4,928	13,712	36
Libby_McNeil_Tract 2	Pierson District 2	418	858	49
Liberte Island	Liberte Island	2,289	14,599	16
Lincoln_Village_Tract	Sargent_Barnhart_Tract 2	309,225	850,828	36
Lisbon_District	Netherlands 4	24,371	73,274	33
Little Holland Tract	Little Holland Tract	0	0	0
Little_Egbert_Tract	Zone 68	8,786	17,928	49
Lower_Roberts_Island	Roberts_Island 2	311	1,076	29
Mandeville_Island	Mandeville_Island	1,303	5,212	25
McCormack_Williamson_Tract	McCormack_Williamson_Tract	977	4,093	24
McDonald_Tract	McDonald_Tract	14,300	30,780	46
McMullin_Ranch-River_Junction Tract	Zone 161	9,677	37,101	26
Medford_Island	Medford_Island	3,347	7,594	44
Merritt Island	Merritt Island	18,854	33,623	56
Middle_Roberts_Island	Roberts_Island 1	60,002	538,471	11
Netherlands 1	Netherlands 1	1,286	3,700	35
Netherlands 2	Netherlands 3	85,355	163,107	52
New_Hope_Tract	New_Hope_Tract	23,540	73,570	32
Orwood_Tract	Palm-Orwood South	39,731	239,425	17
Palm_Tract	Palm-Orwood North	5,032	21,107	24
Paradise Junction	Paradise Junction	21,418	104,426	21
Pescadero	Pescadero	62,683	207,902	30

Table 12–7 Estimate Summary of Asset Cost Damage by Island – 100-Year Flood

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Peter Pocket	Peter Pocket	250	1,879	13
Pico_Naglee_Tract	Zone 126	84,143	242,833	35
Pierson_Tract	Pierson District 1	37,669	71,306	53
Pittsburg	Zone 209	10,043	50,510	20
Prospect_Island	Prospect_Island	742	1,552	48
Quimby_Island	Quimby_Island	209	584	36
RD 17 (Mossdale)	RD 17 Mossdale	209,898	682,140	31
Rindge_Tract	Rindge_Tract	5,093	18,094	28
Rio_Blanco_Tract	Rio_Blanco_Tract	1,102	9,988	11
Roberts_Island	Roberts_Island 3	0	100	0
Rough_and_Ready_Island	Rough_and_Ready_Island	14,103	66,049	21
Ryer Island	Ryer Island	22,394	55,877	40
Sacramento_Pocket_Area	Zone 196	7,467,904	18,758,793	40
Sargent_Barnhart_Tract 1	Sargent_Barnhart_Tract 1	6,819	42,063	16
Sargent_Barnhart_Tract 2	Wright-Elmwood_Tract-Sargent Burnhart Tract	431,024	1,364,049	32
Sargent_Barnhart_Tract 3	Sargent_Barnhart_Tract 3	6,260	15,247	41
Schafter-Pintail Tract	SM-131	808	2,873	28
Sherman_Island	Sherman_Island	16,407	110,416	15
Shima_Tract	Shima_Tract	281,340	670,166	42
Shin_Kee_Tract	Shin_Kee_Tract	1,101	12,324	9
Simmons-Wheeler_Island	SM-203	62	168	37
SM-123	SM-123	4,562	19,683	23
SM-124	SM-124	104,482	373,379	28
SM-132	SM-132	76	175	44
SM-133	SM-133	0	0	0
SM-134	SM-134	0	0	0
SM-198	SM-198	724	4,029	18
SM-199	SM-199	523	1,385	38
SM-202	SM-202	69	177	39
SM-39	SM-39	3,191	15,886	20
SM-40	SM-40	389	1,556	25

Table 12–7 Estimate Summary of Asset Cost Damage by Island – 100-Year Flood

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
SM-41	SM-41	424	3,813	11
SM-42	SM-42	250	1,753	14
SM-43	SM-43	62	168	37
SM-44	SM-44	1,029	5,019	21
SM-46	SM-46	118	471	25
SM-47	SM-47	0	0	0
SM-48	SM-48	6,190	32,145	19
SM-49	SM-49	7,315	32,384	23
SM-52	SM-52	1,104	4,288	26
SM-53	SM-53	8	41	19
SM-54	SM-54	17,220	82,090	21
SM-55	SM-55	895	5,024	18
SM-56	SM-56	535	3,403	16
SM-57	SM-57	2,548	13,558	19
SM-58	SM-58	192	768	25
SM-59	SM-59	432	1,694	25
SM-60	SM-60	2,251	13,559	17
SM-84	SM-84	3,900	13,846	28
SM-85-Grizzly_Island	SM-85	2,698	16,370	16
Smith_Tract	Zone 157	270,733	949,531	29
Stark_Tract	Union_Island 4	161	5,031	3
Staten_Island	Staten_Island	3,863	20,191	19
Stewart_Tract	Stewart_Tract	11,971	47,394	25
Sutter Island	Sutter Island	11,094	22,725	49
Terminous_Tract 1	Terminous_Tract 1	5,285	27,939	19
Terminous_Tract 2	Terminous_Tract 2	28,813	51,468	56
Terminous_Tract 3	Terminous_Tract 3	412	643	64
Twitchell_Island	Twitchell_Island	6,101	12,105	50
Tyler_Island 2	Tyler_Island 2	23,454	91,184	26
Union_Island 1	Union_Island 1	34,608	133,056	26
Union_Island 2	Union_Island 2	21	574	4

Table 12–7 Estimate Summary of Asset Cost Damage by Island – 100-Year Flood

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Union_Island 3	Union_Island 3	393	6,593	6
Union_Island 4	Union_Island 5	123	686	18
Upper_Roberts_Island	Roberts_Island 4	10,381	58,911	18
Van_Sickle_Island	Van_Sickle_Island	30,236	100,540	30
Veale_Tract 1	Veale_Tract 2	4,276	17,738	24
Veale_Tract 2	Veale_Tract 3	736	4,034	18
Venice_Island	Venice_Island	3,352	13,288	25
Victoria_Island	Victoria_Island	25,322	47,053	54
Walnut_Grove	Tyler_Island 1	32,648	40,179	81
Walthal_Tract	Walthal	14,716	39,782	37
Water Body	Water Body	0	0	25
Water Canal	Water Canal	0	224	0
Water Zone 1	Water Zone 1	160,560	381,711	42
Water Zone 2	Water Zone 2	386,013	1,256,735	31
Water Zone 3	Water Zone 3	45,669	140,438	33
Water Zone 4	Water Zone 4	31,788	136,104	23
Water Zone 5	Water Zone 5	31,336	93,185	34
Webb_Tract	Webb_Tract	114	359	32
West Sacramento North	West Sacramento North	1,587,014	2,229,847	71
West Sacramento South 1	West Sacramento South 1	436,240	507,228	86
West Sacramento South 2	West Sacramento South 2	254	1,547	16
Woodward_Island	Woodward_Island	10,280	124,671	8
Wright-Elmwood_Tract	Wright-Elmwood_Tract	1,408	15,967	9
Yolo_Bypass	Moore Tract 2	17,584	115,074	15
Zone 120	Zone 120	10,933	44,266	25
Zone 122	Zone 122	125	125	100
Zone 14	Zone 14	0	432	0
Zone 148	Zone 148	6,082	13,260	46
Zone 155	Zone 155	27	298	9
Zone 158 (Smith Tract_2)	Zone 158	56,925	266,201	21
Zone 160	Zone 160	3,489	11,128	31

Table 12–7 Estimate Summary of Asset Cost Damage by Island – 100-Year Flood

Island Name	Old Island Name	Repair Costs ($1,000)	Asset Value ($1,000)	% of total value damaged
Zone 162	Zone 162	1,183	3,516	34
Zone 171	Zone 171	5,640	28,837	20
Zone 185	Zone 185	130,838	523,318	25
Zone 186	Zone 186	0	3,283	0
Zone 197	Zone 197	13,737	30,316	45
Zone 206	Zone 206	70,134	200,463	35
Zone 207	Zone 207	1,712	7,360	23
Zone 214	Zone 214	0	269	0
Zone 216	Zone 216	204	467	44
Zone 31	Zone 31	140	430	33
Zone 33	Zone 33	53	163	33
Zone 36	Zone 36	1,286	6,953	18
Zone 37	Zone 37	213,933	1,027,059	21
Zone 38	Zone 38	8,498	70,178	12
Zone 64	Zone 64	1,546	6,834	23
Zone 65	Zone 65	87	350	25
Zone 69	Zone 69	212	847	25
Zone 74	Zone 74	7,387	44,631	17
Zone 75	Zone 75	6,987	20,654	34
Zone 77	Zone 77	1,955	9,643	20
Zone 78	Zone 78	6,974	25,063	28
Zone 79	Zone 79	1,937	8,974	22
Zone 80	Zone 80	2,180	10,803	20
Zone 81	Zone 81	1,855	9,156	20
Zone 82	Zone 82	548	7,124	8
Zone 90	Zone 90	6,814	58,199	12
Total Replacement Cost	**-**	**-**	**39,269,170**	-

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
Bacon_Island	Bacon_Island	0	0	8,458
Bethel_Island	Bethel_Island	0	0	16,193
Bishop_Tract	Bishop_Tract	37,819	864	15,080
Bixler_Tract	Veale_Tract 1	508	165	22
Boggs_Tract	Zone 159	269,101	10,208	18,623
Bouldin_Island	Bouldin_Island	0	0	11,310
Brack_Tract	Brack_Tract	0	0	2,653
Bradford_Island	Bradford_Island	0	0	7,030
Brannan-Andrus Island	Brannan-Andrus Island	3,000	16	51,066
Browns_Island	Browns_Island	0	0	0
Byron_Tract 1	Byron_Tract 1	1,500	25	6,293
Byron_Tract 2	Byron_Tract 2	4,960	236	11,069
Byron_Tract 3	Byron_Tract 3	20,192	4,490	531
Cache_Haas_Tract 1	Moore Tract 3	2,335	29	22,968
Cache_Haas_Tract 2	Moore Tract 1	0	0	1,462
Canal Ranch	Canal Ranch	2,796	55	1,235
Chipps_Island	Chipps_Island	0	0	0
Clifton Court Forebay Water	Clifton Court Forebay Water	23	1	3,183
Coney_Island	Coney_Island	0	0	0
Deadhorse Island	Deadhorse Island	0	0	734
Decker_Island	Decker_Island	0	0	1,528
Discovery_Bay	Discovery_Bay	417,511	18,566	16,190
Egbert_Tract	Zone 70	0	0	4,537
Elk_Grove 1	Zone 76	48,432	583	13,362
Empire_Tract	Empire_Tract	0	0	5,549
Fabian_Tract	Fabian_Tract	2,329	27	11,510
Fay Island	Fay Island	0	0	17
Glanville_Tract	Glanville_Tract	6,670	121	8,674
Gliole_District	Netherlands 2	0	0	5,302

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
Grand Island	Grand Island	3,250	22	41,647
Hastings_Tract 1	Hastings_Tract 1	2	0	0
Hastings_Tract 2	Hastings_Tract 2	0	0	3,378
Holland_Land	Netherlands 5	0	0	2,522
Holland_Tract	Holland_Tract	1,500	30	6,211
Honker_Bay_Club	SM-201	112	6	1,842
Hotchkiss_Tract 1	Hotchkiss_Tract 1	24,579	847	12,013
Hotchkiss_Tract 2	Hotchkiss_Tract 2	0	0	1,107
Jersey_Island	Jersey_Island	0	0	13,129
Jones_Tract-Upper_and_Lower	Jones_Tract	2,000	23	37,556
Kasson_District	Zone 121	800	37	2,595
King_Island	King_Island	3,000	73	5,077
Libby_McNeil_Tract 1	Pierson District 3	5,992	1,035	2,791
Libby_McNeil_Tract 2	Pierson District 2	389	61	52
Liberte Island	Liberte Island	1,500	21	5,773
Lincoln_Village_Tract	Sargent_Barnhart_Tract 2	414,014	17,758	19,497
Lisbon_District	Netherlands 4	32,579	561	9,905
Little Holland Tract	Little Holland Tract	0	0	0
Little_Egbert_Tract	Zone 68	1,500	29	5,101
Lower_Roberts_Island	Roberts_Island 2	67	15	698
Mandeville_Island	Mandeville_Island	0	0	3,909
McCormack_Williamson_Tract	McCormack_Williamson_Tract	0	0	3,116
McDonald_Tract	McDonald_Tract	0	0	9,512
McMullin_Ranch-River_Junction Tract	Zone 161	4,597	98	11,720
Medford_Island	Medford_Island	0	0	4,247
Merritt Island	Merritt Island	0	0	13,206
Middle_Roberts_Island	Roberts_Island 1	6,134	34	44,026
Netherlands 1	Netherlands 1	0	0	2,303

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
Netherlands 2	Netherlands 3	2,550	17	32,573
New_Hope_Tract	New_Hope_Tract	5,138	82	9,756
Orwood_Tract	Palm-Orwood South	0	0	9,535
Palm_Tract	Palm-Orwood North	0	0	10,899
Paradise Junction	Paradise Junction	18,518	583	7,001
Pescadero	Pescadero	8,662	168	14,918
Peter Pocket	Peter Pocket	231	9	1,101
Pico_Naglee_Tract	Zone 126	10,938	223	17,844
Pierson_Tract	Pierson District 1	3,944	51	16,463
Pittsburg	Zone 209	22,716	628	17,606
Prospect_Island	Prospect_Island	0	0	810
Quimby_Island	Quimby_Island	750	57	0
RD 17 (Mossdale)	RD 17 Mossdale	135,326	1,660	30,570
Rindge_Tract	Rindge_Tract	250	3	17,001
Rio_Blanco_Tract	Rio_Blanco_Tract	1,500	57	5,798
Roberts_Island	Roberts_Island 3	100	58	0
Rough_and_Ready_Island	Rough_and_Ready_Island	20,160	771	16,922
Ryer Island	Ryer Island	1,500	15	18,146
Sacramento_Pocket_Area	Zone 196	1,804,749	14,275	141,955
Sargent_Barnhart_Tract 1	Sargent_Barnhart_Tract 1	38,591	5,328	1,583
Sargent_Barnhart_Tract 2	Wright-Elmwood_Tract-Sargent Burnhart Tract	496,000	11,799	38,416
Sargent_Barnhart_Tract 3	Sargent_Barnhart_Tract 3	8,567	6,181	238
Schafter-Pintail Tract	SM-131	165	6	1,844
Sherman_Island	Sherman_Island	0	0	34,985
Shima_Tract	Shima_Tract	263,652	5,753	22,235
Shin_Kee_Tract	Shin_Kee_Tract	0	0	5,881
Simmons-Wheeler_Island	SM-203	89	2	0
SM-123	SM-123	7,100	166	6,559

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
SM-124	SM-124	119,205	2,100	29,235
SM-132	SM-132	99	8	0
SM-133	SM-133	0	0	0
SM-134	SM-134	0	0	0
SM-198	SM-198	442	7	2,780
SM-199	SM-199	259	161	598
SM-202	SM-202	100	6	0
SM-39	SM-39	5,457	269	7,237
SM-40	SM-40	0	0	1,167
SM-41	SM-41	29	16	3,360
SM-42	SM-42	750	366	753
SM-43	SM-43	106	8	0
SM-44	SM-44	919	101	3,071
SM-46	SM-46	2	0	351
SM-47	SM-47	0	0	0
SM-48	SM-48	12,602	286	6,463
SM-49	SM-49	11,406	315	9,533
SM-51	SM-51	0	0	0
SM-52	SM-52	1,859	95	1,318
SM-53	SM-53	24	6	8
SM-54	SM-54	39,184	809	18,732
SM-55	SM-55	188	5	3,894
SM-56	SM-56	364	6	2,345
SM-57	SM-57	5,252	141	6,041
SM-58	SM-58	0	0	576
SM-59	SM-59	115	4	1,128
SM-60	SM-60	4,903	210	601
SM-84	SM-84	830	9	6,107
SM-85-Grizzly_Island	SM-85	554	7	12,199

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
Smith_Tract	Zone 157	434,795	18,268	27,622
Stark_Tract	Union_Island 4	187	12	4,462
Staten_Island	Staten_Island	0	0	7,313
Stewart_Tract	Stewart_Tract	10,198	150	11,608
Sutter Island	Sutter Island	0	0	11,352
Terminous_Tract 1	Terminous_Tract 1	2,284	84	4,483
Terminous_Tract 2	Terminous_Tract 2	1,750	19	10,441
Terminous_Tract 3	Terminous_Tract 3	194	96	38
Twitchell_Island	Twitchell_Island	0	0	4,431
Tyler_Island 2	Tyler_Island 2	33,829	309	24,227
Union_Island 1	Union_Island 1	0	0	29,217
Union_Island 2	Union_Island 2	0	0	553
Union_Island 3	Union_Island 3	196	12	5,611
Union_Island 4	Union_Island 5	0	0	564
Upper_Roberts_Island	Roberts_Island 4	5,685	72	19,317
Van_Sickle_Island	Van_Sickle_Island	220	6	0
Veale_Tract 1	Veale_Tract 2	2,918	115	5,008
Veale_Tract 2	Veale_Tract 3	3,279	564	19
Venice_Island	Venice_Island	0	0	9,447
Victoria_Island	Victoria_Island	0	0	16,209
Walnut_Grove	Tyler_Island 1	3,076	294	4,389
Walthal_Tract	Walthal	11,721	N/A	6,296
Water Canal	Water Canal	0	N/A	0
Water Zone 1	Water Zone 1	1,195	N/A	9,804
Water Zone 2	Water Zone 2	4	N/A	2
Water Zone 3	Water Zone 3	0	N/A	0
Water Zone 4	Water Zone 4	0	N/A	8
Water Zone 5	Water Zone 5	0	N/A	0
Webb_Tract	Webb_Tract	0	0	245

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
West Sacramento North	West Sacramento North	150,479	2,261	70,257
West Sacramento South 1	West Sacramento South 1	4,306	66	20,831
West Sacramento South 2	West Sacramento South 2	0	0	1,293
Woodward_Island	Woodward_Island	0	0	5,863
Wright-Elmwood_Tract	Wright-Elmwood_Tract	0	0	9,394
Yolo_Bypass	Moore Tract 2	11,201	61	27,429
Zone 120	Zone 120	4,465	78	11,120
Zone 122	Zone 122	0	0	0
Zone 14	Zone 14	0	0	432
Zone 148	Zone 148	479	11	6,124
Zone 155	Zone 155	0	0	271
Zone 158 (Smith Tract_2)	Zone 158	190,639	19,807	17,347
Zone 160	Zone 160	6,245	1,243	1,395
Zone 162	Zone 162	1,205	81	1,127
Zone 171	Zone 171	4,892	89	9,440
Zone 185	Zone 185	374,932	28,635	16,055
Zone 186	Zone 186	0	0	3,283
Zone 197	Zone 197	0	0	16,250
Zone 206	Zone 206	78,778	1,705	19,695
Zone 207	Zone 207	0	0	5,649
Zone 214	Zone 214	0	0	269
Zone 216	Zone 216	263	72	0
Zone 31	Zone 31	290	118	0
Zone 33	Zone 33	110	62	0
Zone 36	Zone 36	3,832	661	1,812
Zone 37	Zone 37	88,122	7,355	6,371
Zone 38	Zone 38	35,273	5,416	26,591
Zone 64	Zone 64	4,035	3,517	1,252
Zone 65	Zone 65	0	0	262

Table 12–8 Estimate Summary of Asset Cost Damage by Island – Scour (100-Year Flood)

Island Name	Old Island Name	Differential Repair Costs for Point Assets - By Island ($1,000)	1,000ft Increment Cost for Point Assets - By Island ($1,000)	Differential Repair Costs for Linear Assets ($1,000)
Zone 69	Zone 69	0	0	635
Zone 74	Zone 74	1,032	29	8,704
Zone 75	Zone 75	5,016	133	4,204
Zone 77	Zone 77	3,392	441	4,381
Zone 78	Zone 78	5,327	147	4,164
Zone 79	Zone 79	1,693	68	3,233
Zone 80	Zone 80	1,659	57	4,779
Zone 81	Zone 81	2,080	49	2,384
Zone 82	Zone 82	0	0	4,494
Zone 90	Zone 90	17,092	500	34,293

Table 12–9 Summary of Business Sales and Cost Analysis, 2005 and 2030

For All Analysis Zones

	MHHW Flood		100-Year Flood	
	2005	**2030**	**2005**	**2030**
Number of businesses	883	883	15,930	15,930
Economic costs				
Mil $ One-time cost if flooded	$0.88	$0.88	$15.93	$15.93
Mil $ Lost Profit per Day Lost Use	$0.60	$0.97	$8.27	$17.83
Mil $ Lost Profit per Day after RPCs [1.]	$0.05	$0.10	$1.22	$2.42
Economic Impact, Includes Backward Linkages (after RPCs)				
Mil $ Value of Output	$1.05	$1.85	$24.40	$48.48
Person-years Employment [2.]	10	13	222	326
Mil $ Labor income	$0.35	$0.64	$8.41	$17.89
Mil $ Value Added [3.]	$0.58	$1.04	$13.08	$27.07

[1] After accounting for lost sales that are captured by other California businesses

[2] One person year of employment is 365 persons unemployed per day

[3] Value added is labor income, proprietors' income, other property income and indirect business taxes

Note that the large number of businesses associated with the 100 year flood zone reflect the inclusion of south and west Sacramento and parts of Stockton in the larger area. The MHHW zone is, by contrast, largely confined to the primary Delta. The Economic Consequences Technical Memorandum (URS/JBA 2008f) provides these details by analysis zone.

RPC = regional purchase coefficient

Table 12–10 CVPM Areas Analyzed and Corresponding Irrigation Areas

CVPM Region	Irrigation Areas Included
R10	Delta Mendota Canal, CVP Users: Panoche Pacheco, Del Puerto, Hospital, sunflower, West Stanislaus, Mustang, Orestimba Patterson, Foothill, San Luis WD, Broadview, Eagle Field, Mercy Springs, Pool Exchange Contractors, Schedule 2 water, more.
R13	Merced ID CVP Users: Chowchilla, Madera, Gravelly Ford
R14	Westlands WD
R15	Tulare Lake Bed, CVP Users: Fresno Slough, James, Tranquility, Traction Ranch, Laguna Real, Dist. 1606
R16	Eastern Fresno C. CVP Users: Friant-Kern Canal, Fresno 10, Garfield, International
R17	Friant-Kern Canal, Hills Valley, Tri-Valley Orange Cove
R18	Friant-Kern Canal, County of Fresno, Lower Tule River ID, Pixley ID, Portion of Rag Gulch, Ducor, County of Tulare, most of Delano Earlimart, Exeter, Ivanhoe, Lewis Cr., Lindmore, Lindsay-Strathmore, Porterville, Sausalito, Stone Corral, Tea Pot Dome, Terra Bella, Tulare
R19	Kern Co. SWP Service Area
R20	Friant-Kern Canal, Shafter Wasco, S. San Joaquin
R21	Cross-Valley Canal, Friant-Kern Canal, Arvin Edison

Note:
For this analysis, Region 10 was separated into Exchange Contractors and others to appropriately reflect the greater reliability of water supplies to Exchange Contractors.

CVPM = Central Valley Production Model

Table 12-11 Regional Water Supplies[1] (1,000 Acre-feet), Permanent Crops, and Gross Crop Revenue[2]

Water Source	R10A	R10B	R13	R14	R15	R16	R17	R18	R19	R20	R21	TOTAL
CVP (Delta + Friant)	360	657	317	986	84	62	33	508	-	539	107	3,653
SWP	5	-	-	-	265	-	-	-	737	58	357	1,421
Local Surface & Gw	64	-	454	211	334	272	295	335	27	20	156	2,168
Total Supplies	429	657	771	1,197	683	334	328	843	764	617	619	7,241
% Of Acreage In Permanent Crops	17%	5%	46%	9%	17%	86%	38%	25%	70%	24%	33%	
Gross Crop Revenue ($million)	366	277	1,082	931	803	352	646	1,215	487	545	670	7,376

Notes:
R10A = Non Exchange Contractors
R10B = Exchange Contractors
[1] Regional Water Supplies are for year 2000, an average water year.
[2] Gross Crop Revenue in millions of $2002.

Table 12–12 Population with Urban Water Supplies Potentially Affected by Delta Levee Failures

		Population	
Supplier	**Agency**	**2005**	**2030**
SWP/CVP/SFPUC	Santa Clara Valley Water District[1]	1,750,000	2,267,100
CVP	Contra Costa Water District	507,800	649,300
CVP	City of Tracy	70,800	160,100
CVP	City of Avenal	16,200	23,500
CVP	City of Coalinga	17,100	24,800
CVP	City of Dos Palos	4,800	7,000
CVP	City of Huron	7,000	10,200
	Subtotal CVP[2]	**2,373,700**	**3,142,000**
SWP	Alameda County Water District	324,000	405,900
SWP	Alameda Zone 7	196,000	264,000
SWP	Kern County Water Agency	326,000	458,000
SWP	Antelope Valley- East Kern	313,500	650,400
SWP	Palmdale Water District	109,800	214,300
SWP	San Gabriel Valley MWD	217,000	239,800
SWP	Castaic Lake Water Agency	235,000	401,700
SWP	Desert Water Agency	68,000	100,000
SWP	Coachella Valley WD	314,300	490,600
SWP	Crestline-lake Arrowhead Water Agency	34,500	46,100
SWP	Mojave Water Agency	358,800	700,000
SWP	San Bernardino Valley MWD	661,700	1,097,700
SWP	MWD of Southern California	18,233,800	22,053,200
SWP	Central Coast Water Authority	409,000	618,200
SWP	Casitas Municipal Water District	66,200	78,800
	Subtotal SWP[2]	**23,617,600**	**30,085,800**
	Total Export Projects[3]	**24,241,300**	**30,960,700**
EBMUD	EBMUD	1,338,000	1,017,000
	Total Potentially Disrupted[3]	**25,579,300**	**31,977,700**

Notes:
[1] SFPUC does not serve SCVWD but supplies water to SCVWD retail customers
[2] Includes SCVWD
[3] SCVWD included only once
[4] Not including those in SCVWD service territory
Source: Urban Water Management Plans
For smaller CVP towns, San Joaquin Council of Governments
http://www.sjcog.org/sections/departments/planning/research/projections

Table 12–13 Recommended Daily Economic Costs for Combinations of Delta Road Closures

Highway Number and Status						Recommended Cost per Day, Million $
4	**12**	**160**	**205**	**J11**	**I-5**	
Closed	Open	Open	Open	Open	Open	$0.50
Open	Closed	Open	Open	Open	Open	$0.30
Open	Open	Closed	Open	Open	Open	$0.12
Open	Open	Open	Closed	Open	Open	$4.00
Open	Open	Open	Open	Closed	Open	$0.10
Open	Open	Open	Open	Open	Closed	$3.00
Closed	Closed	Open	Open	Open	Open	$0.96
Closed	Open	Closed	Open	Open	Open	$0.74
Closed	Open	Open	Closed	Open	Open	$5.40
Closed	Open	Open	Open	Closed	Open	$0.72
Closed	Open	Open	Open	Open	Closed	$4.20
Open	Closed	Closed	Open	Open	Open	$0.50
Open	Closed	Open	Closed	Open	Open	$5.16
Open	Closed	Open	Open	Closed	Open	$0.48
Open	Closed	Open	Open	Open	Closed	$3.96
Open	Open	Closed	Closed	Open	Open	$4.94
Open	Open	Closed	Open	Closed	Open	$0.26
Open	Open	Closed	Open	Open	Closed	$3.74
Closed	Closed	Closed	Open	Open	Open	$1.29

Source: Economic Consequences Technical Memorandum (URS/JBA 2008f).

Table 12–14 Economic Costs for Railroad Disruption

($million per month)

	2005	**2030**
Oakland to Sacramento lines	$23.5	$39.6
Fremont to Stockton	$6.1	$10.3

Source: Economic Consequences Technical Memorandum (URS/JBA 2008f).

Table 12–15 Summary of Economic Costs Associated with Lost Use of Wastewater Facilities

Facility	Analysis Zone	Cost/Day of Outage	When Cost Incurred
City of Stockton	Zone 159	$9,000,000 or less	Immediately when flooded
City of Stockton	Roberts Island	Discharge of secondary treated effluent to the Delta. No cost estimate available.	Immediately when flooded
Ironhouse	Jersey Island	$930,000	After 1 week in winter, 1 month in summer
City of Isleton	Brannan Andrus	$50,000	About ½ is a new subdivision
City of Sacramento	Zone 76, 196	$26,800,000 or less	Only if the existing ring levee fails (22 feet)

Source: Economic Consequences Technical Memorandum (URS/JBA 2008f).

Figures

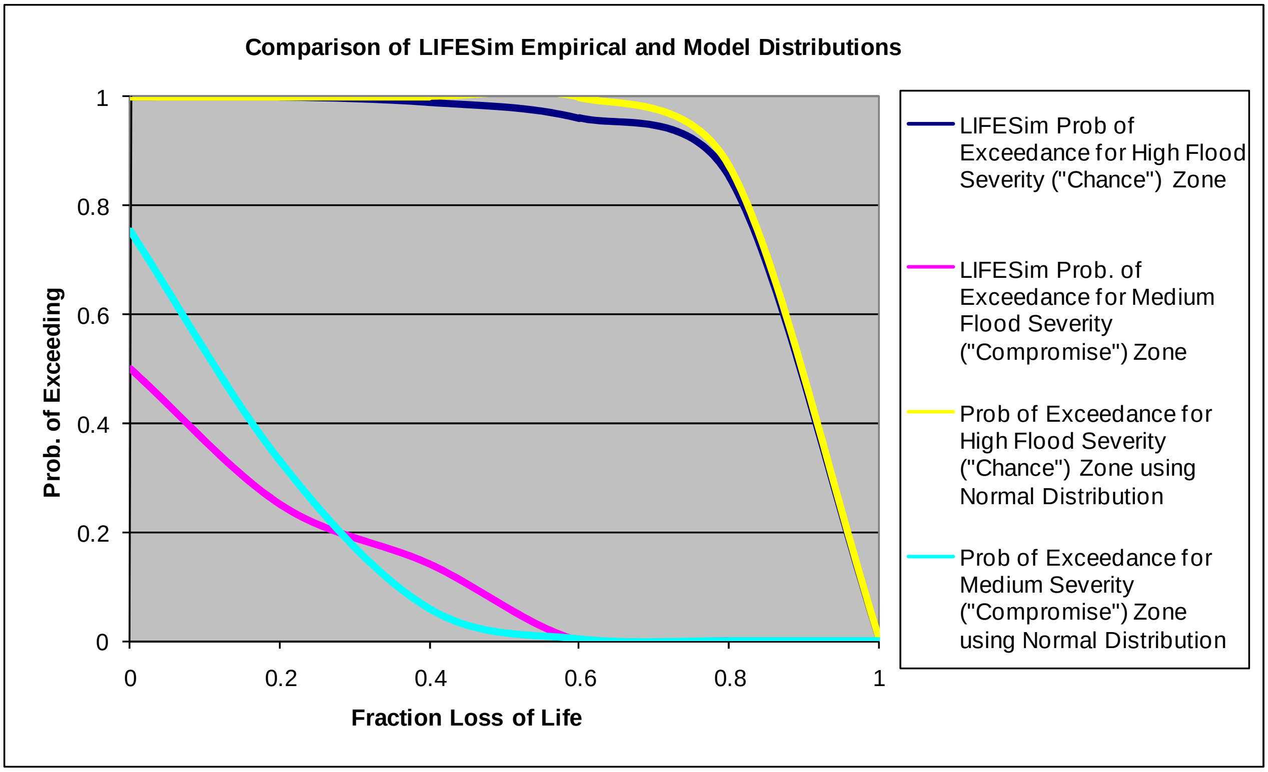


Figure 12–1 Model and empirical distributions of fraction life-loss

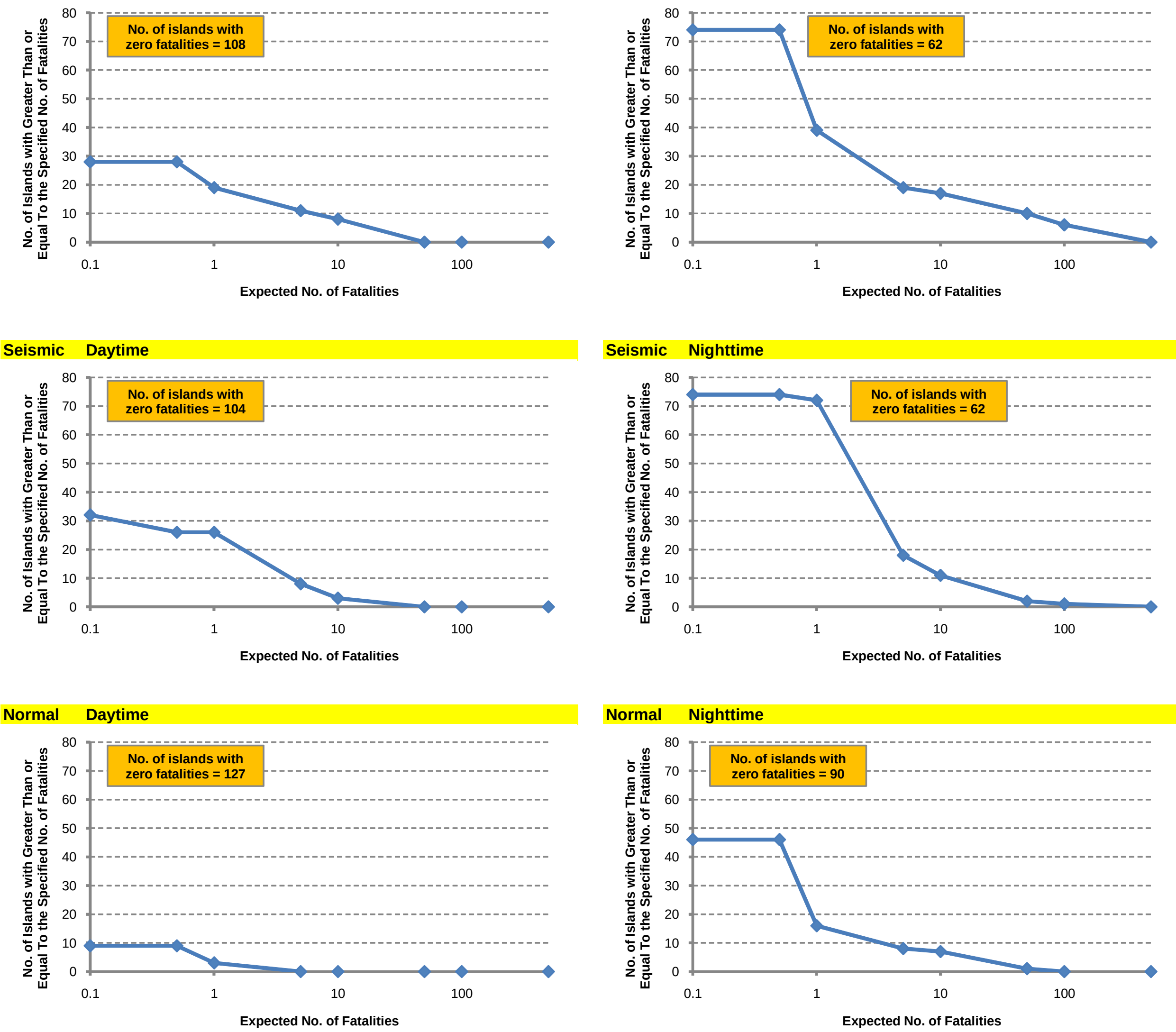


Figure 12–2 Number of islands with different expected number of fatalities given a breach

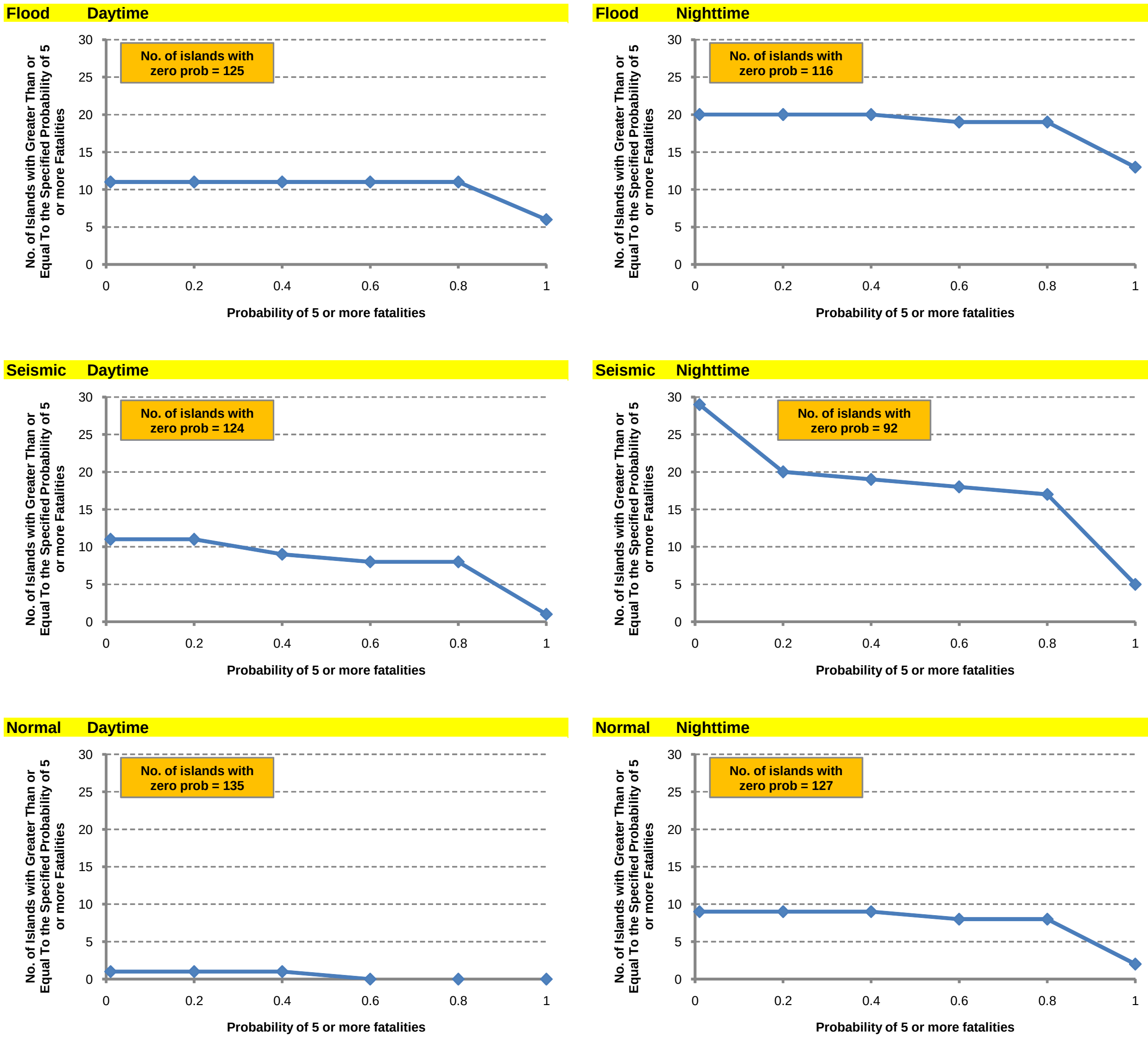


Figure 12–3 Number of islands with different (conditional) probabilities of 5 or more fatalities given a breach

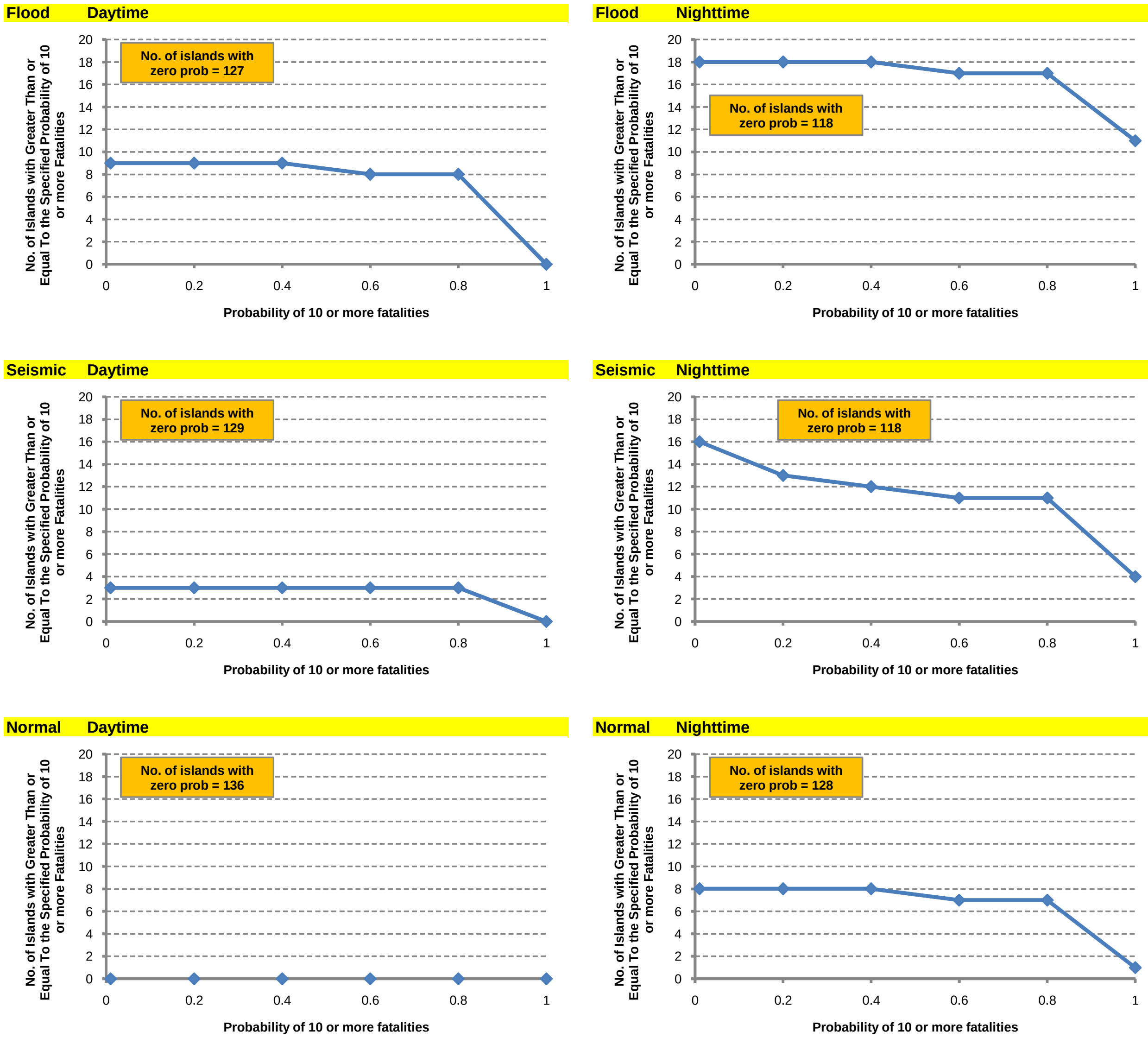


Figure 12–4 Number of islands with different (conditional) probabilities of 10 or more fatalities given a breach

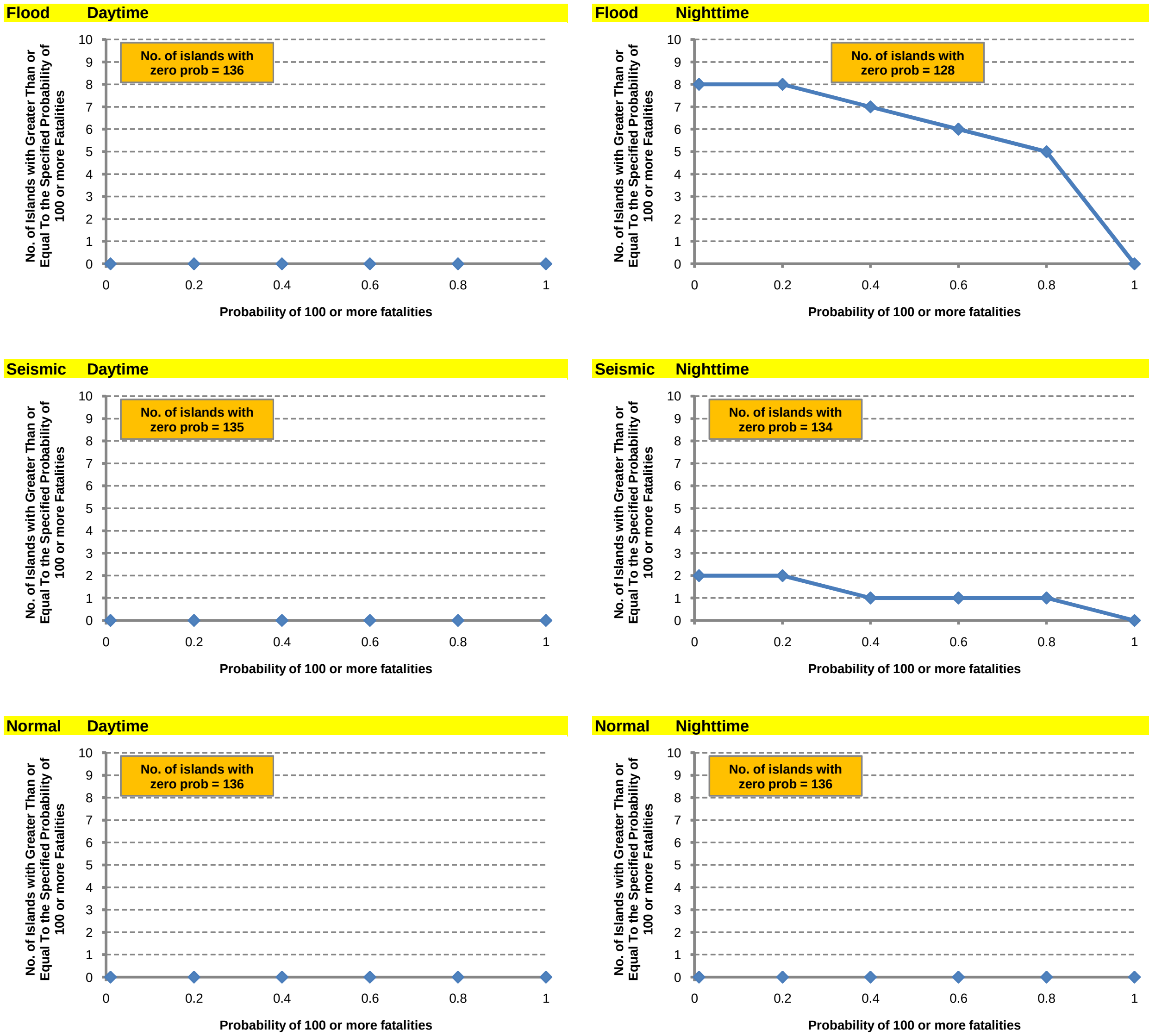
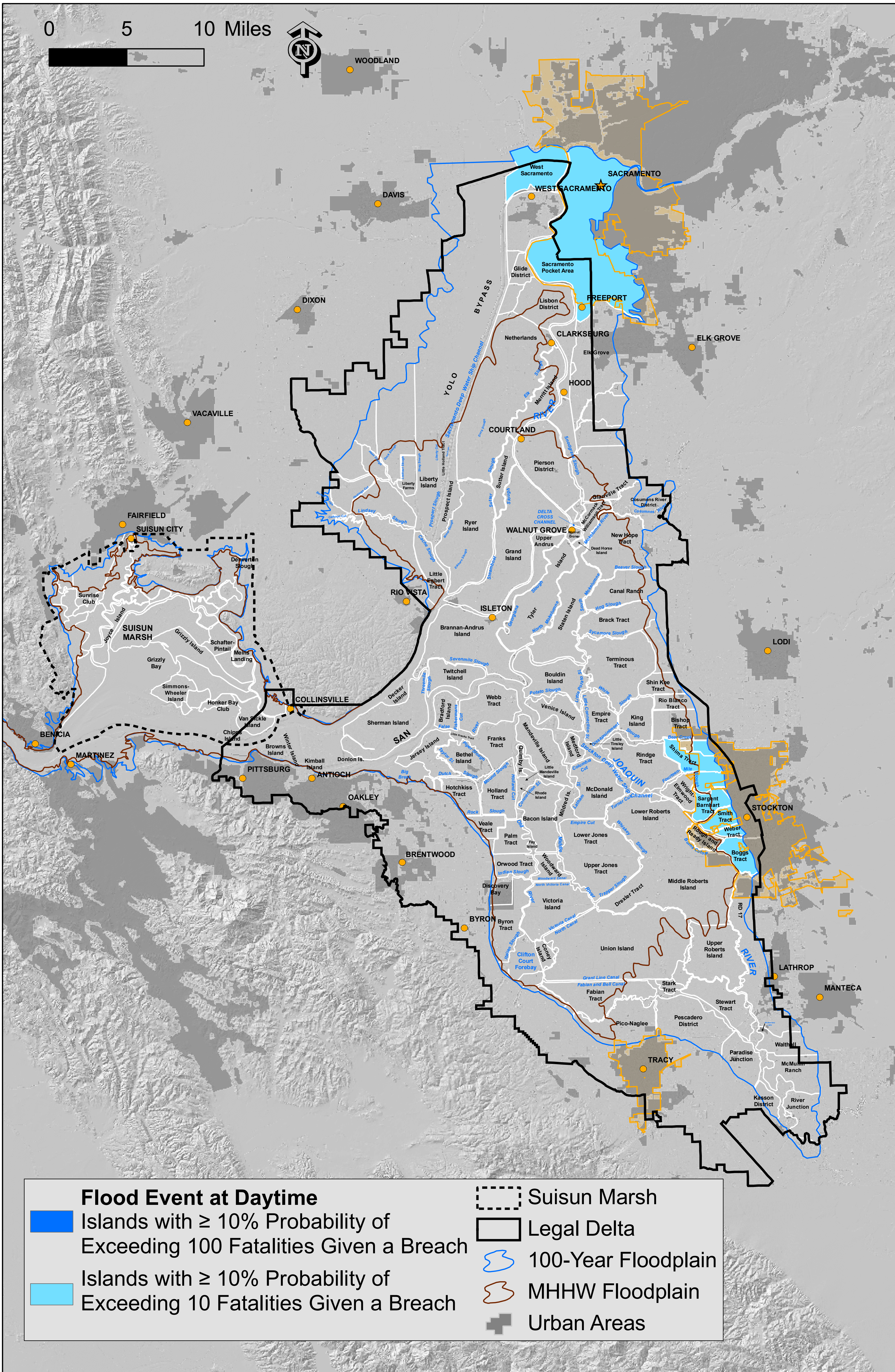


Figure 12–5 Number of islands with different (conditional) probabilities of 100 or more fatalities given a breach



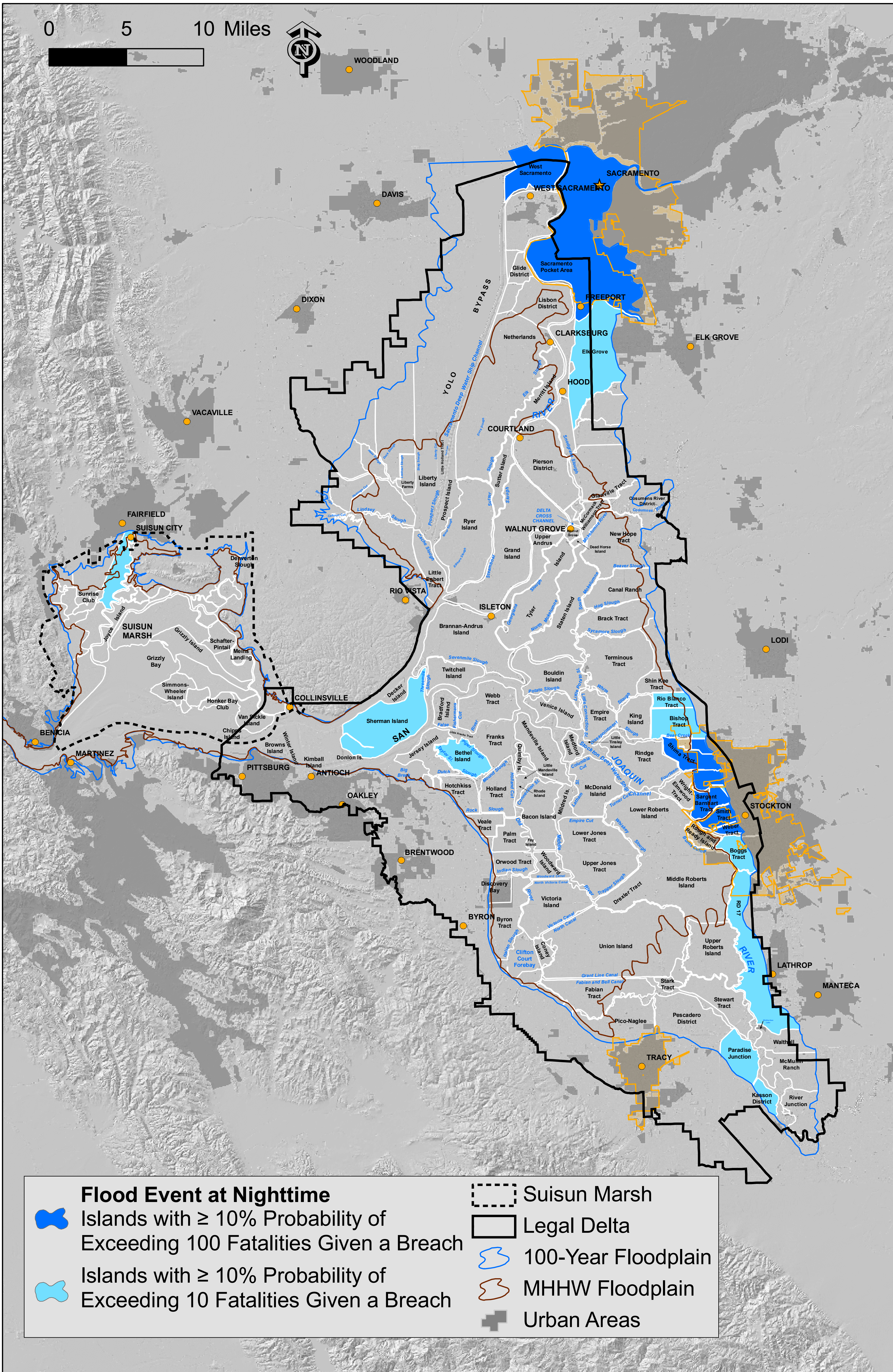
Delta Risk Management Strategy (DRMS)
Phase 1

26815935

Fatality Risks for
Flood Event at Daytime

Figure
12-6

URS



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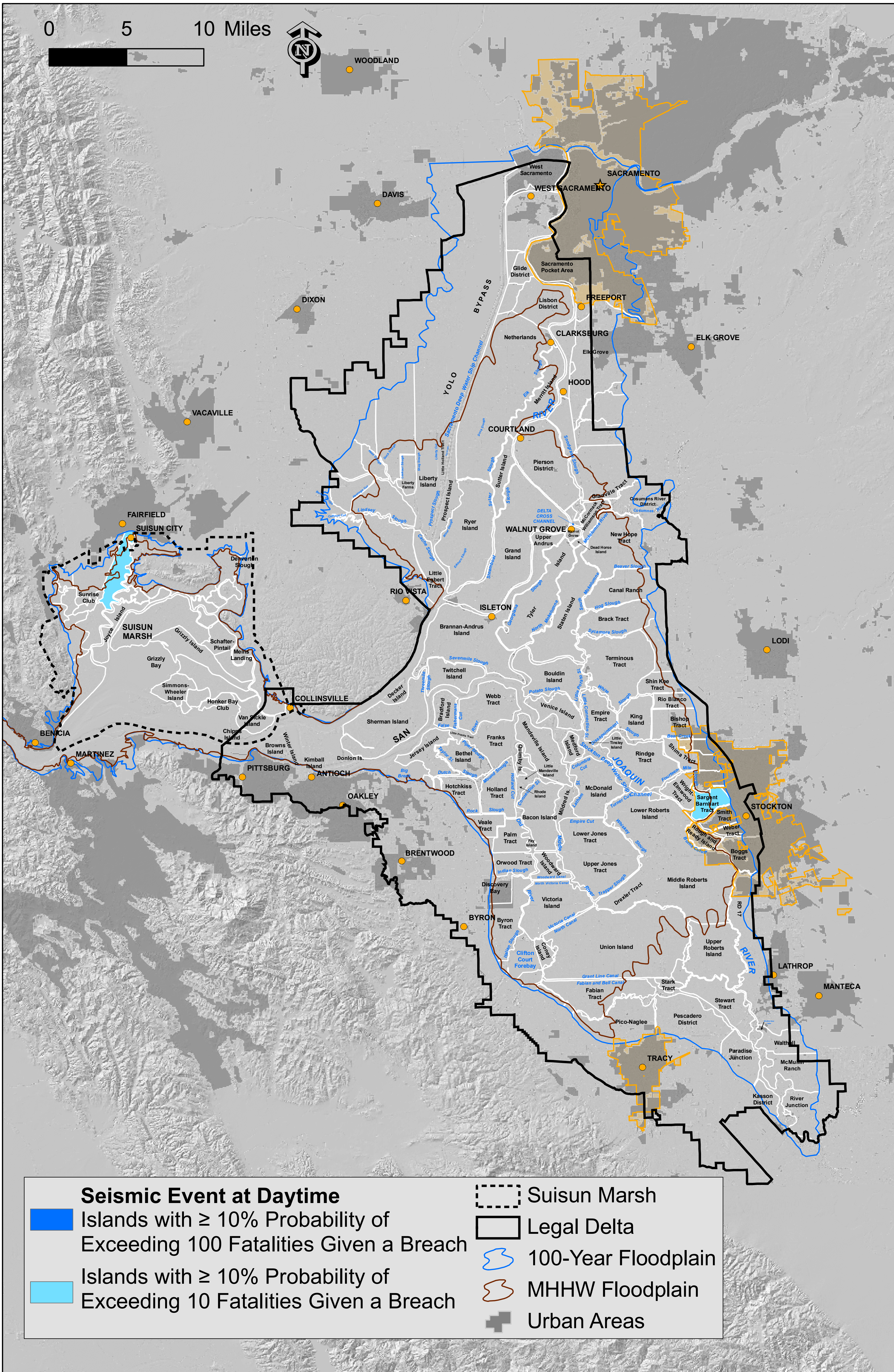
Fatality Risks for Flood Event at Nighttime

Figure 12-7



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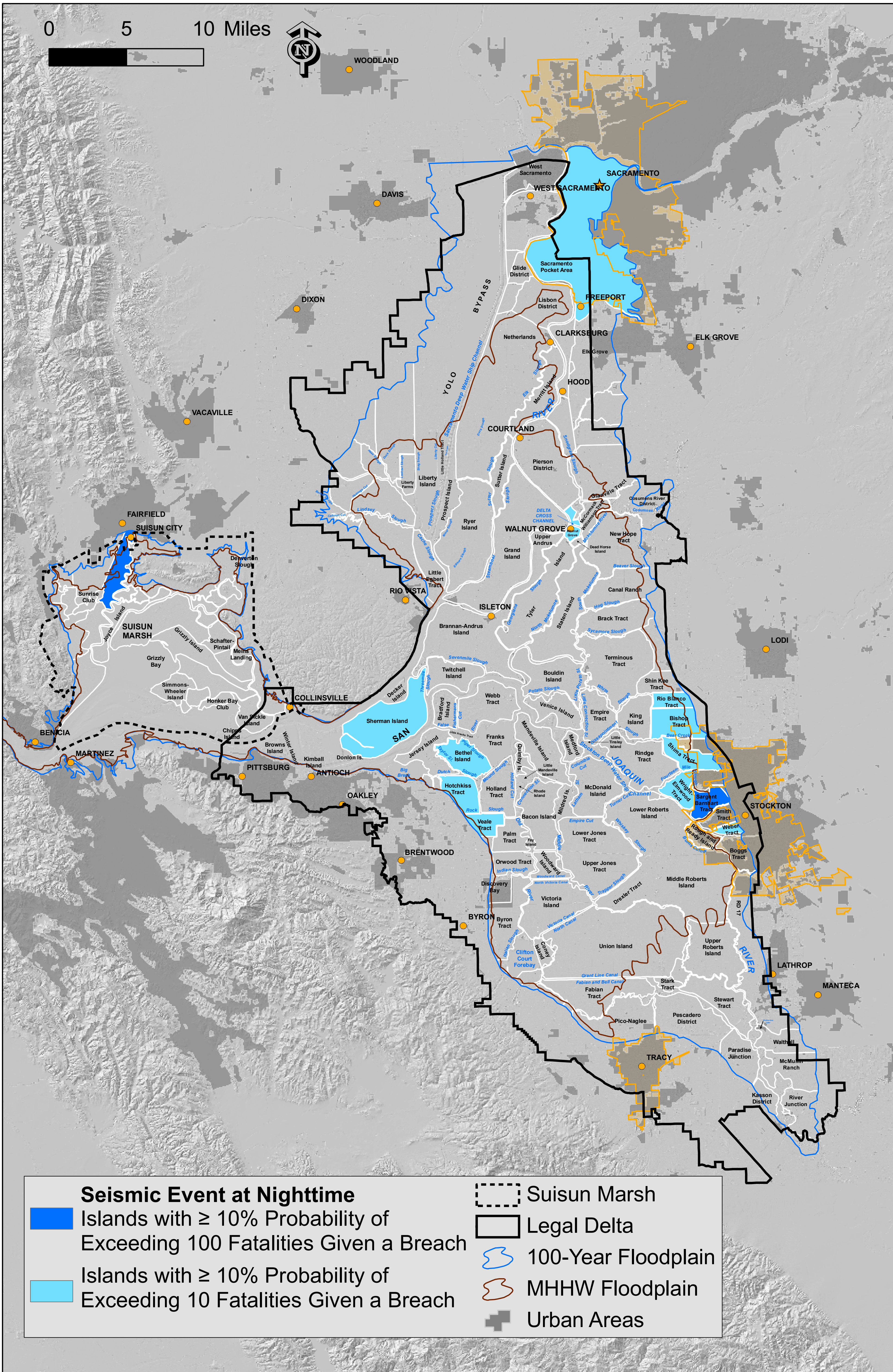
URS	Delta Risk Management Strategy (DRMS) Phase 1 26815935	Fatality Risks for Seismic Event at Daytime	Figure 12-8



URS

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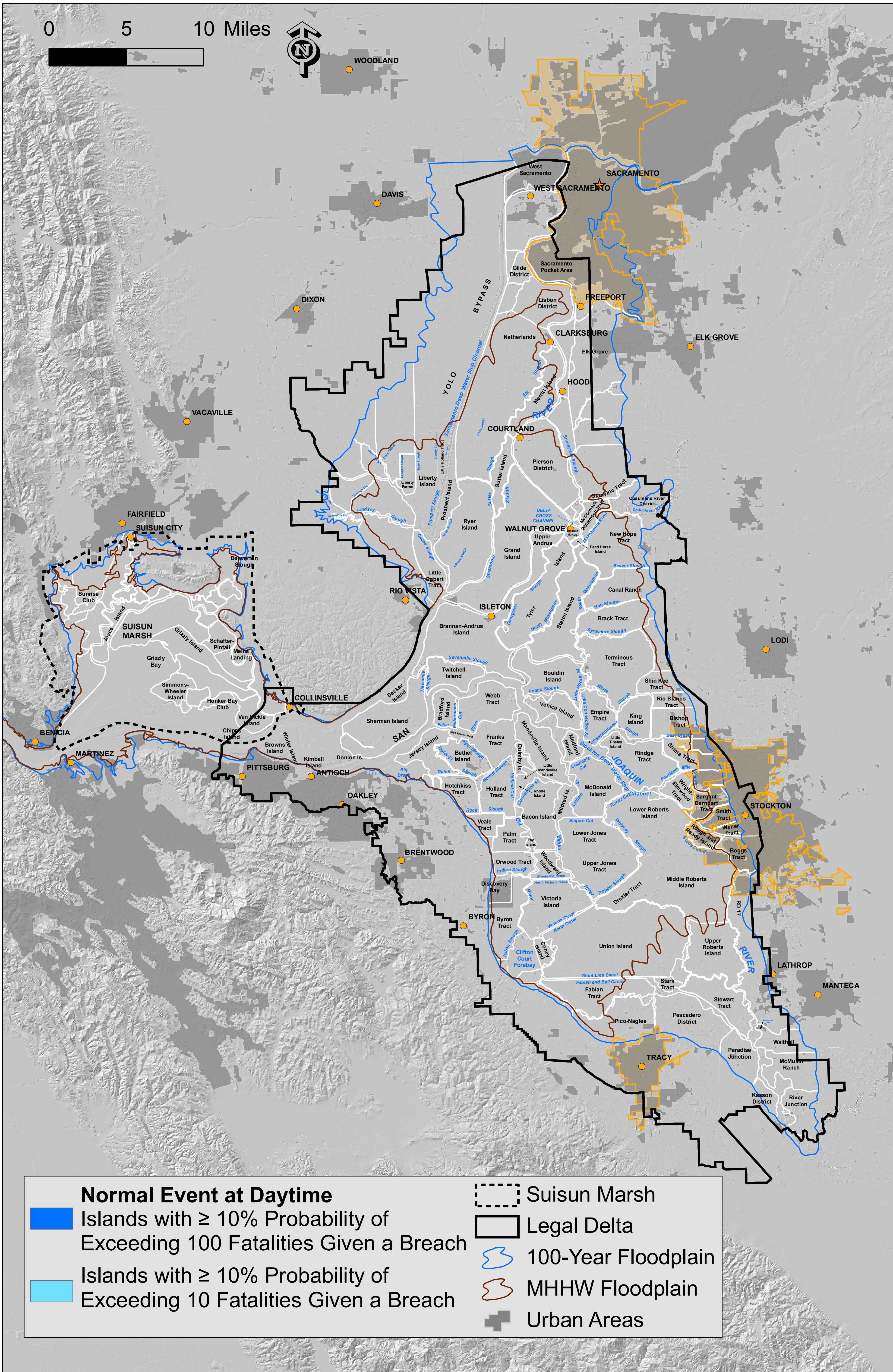
Fatality Risks for
Seismic Event at Nighttime

Figure
12-9



Delta Risk Management Strategy (DRMS)
Phase 1

26815935

Fatality Risks for
Normal Event at Daytime

Figure
12-10

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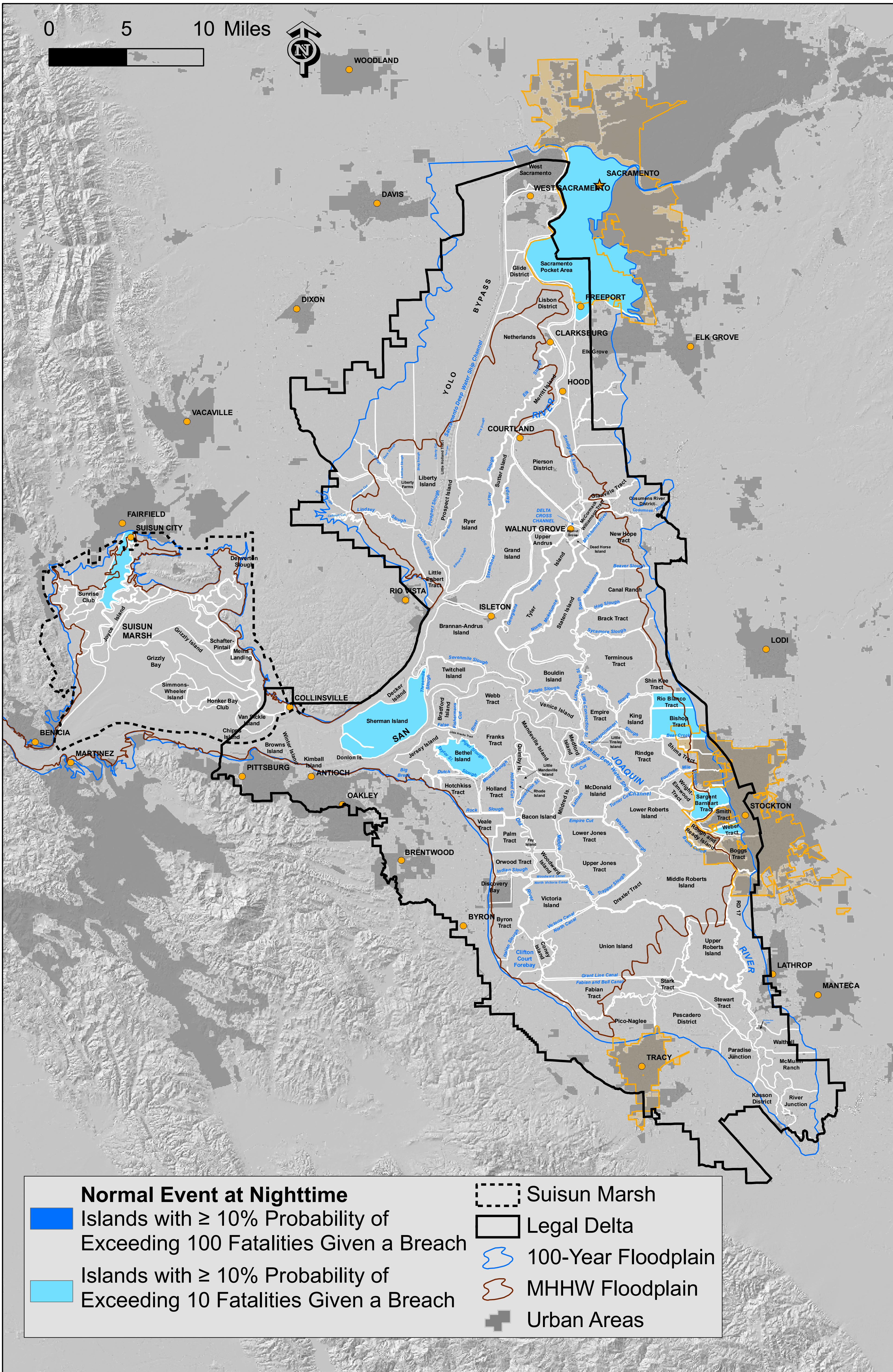

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Delta Risk Management Strategy (DRMS)
Phase 1

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Fatality Risks for
Normal Event at Nighttime

Figure
12-11

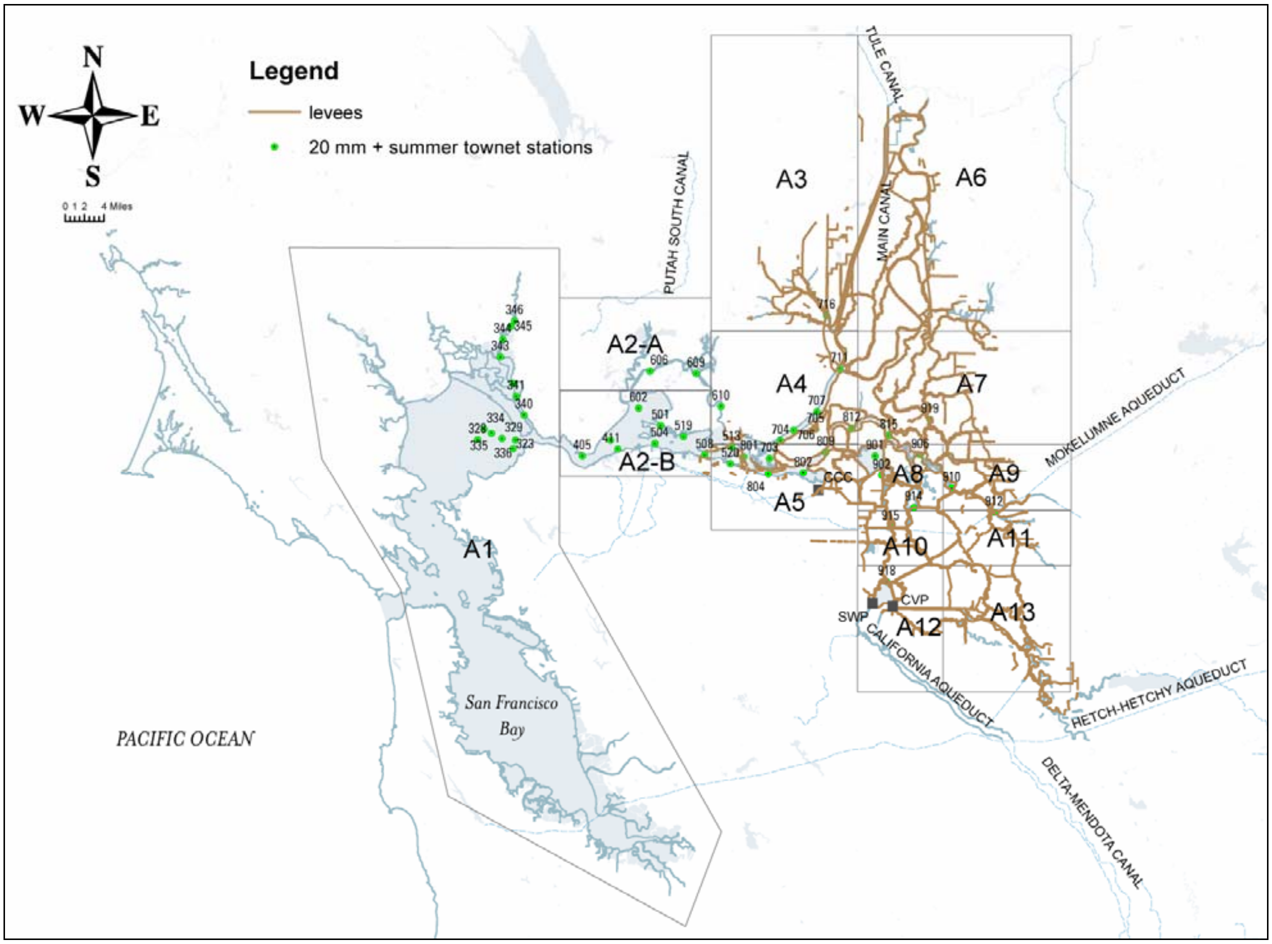
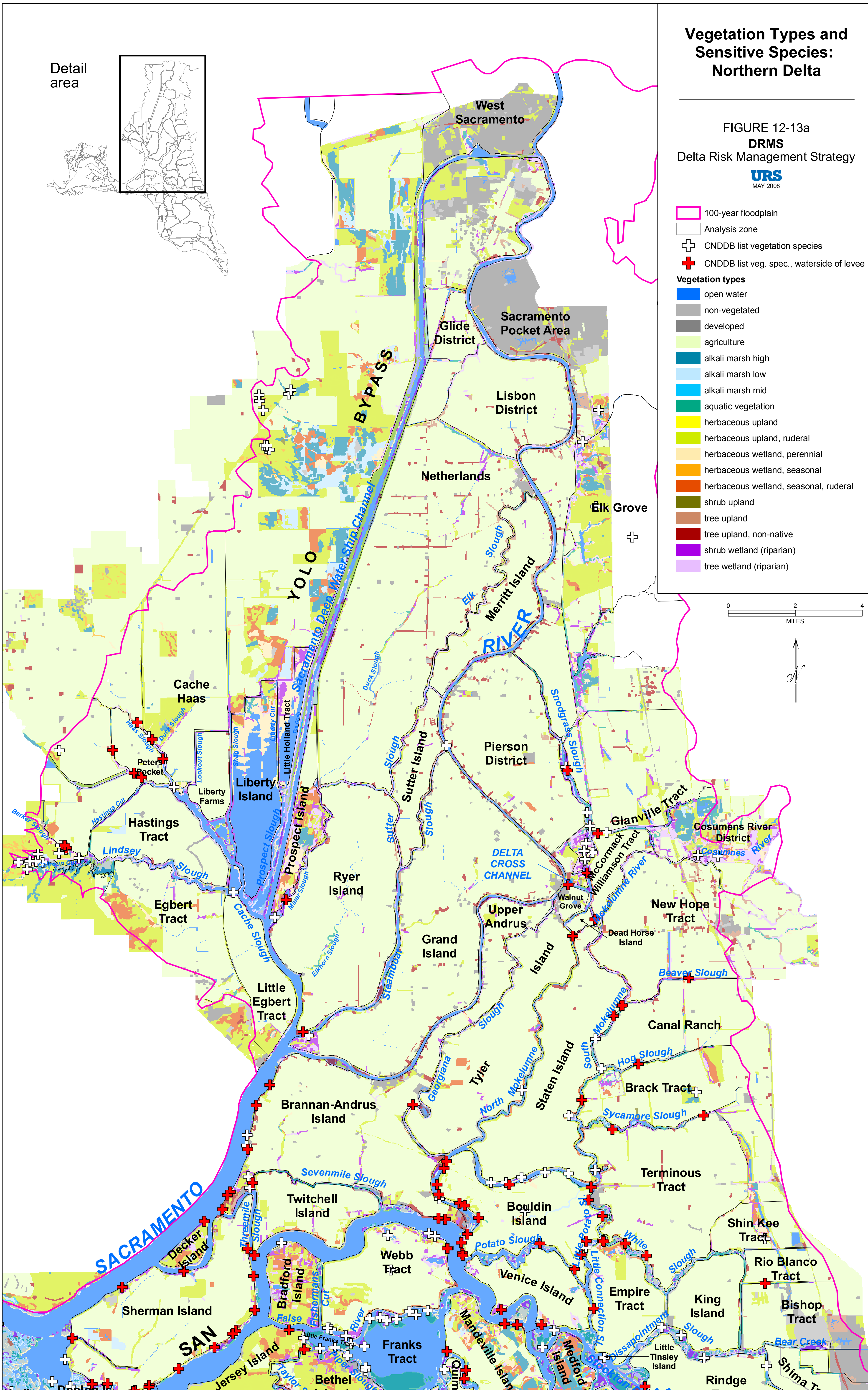


Figure 12–12 Division of the Delta developed for the DRMS fishery assessment and sites of relative CDFG fishery sampling sites (20 mm delta smelt survey)

Note: Source: CDFG 2006 data



Vegetation Types and Sensitive Species: Northern Delta

FIGURE 12-13a

DRMS

Delta Risk Management Strategy

URS

MAY 2008

- 100-year floodplain
- Analysis zone
- CNDDB list vegetation species
- CNDDB list veg. spec., waterside of levee

Vegetation types

- open water
- non-vegetated
- developed
- agriculture
- alkali marsh high
- alkali marsh low
- alkali marsh mid
- aquatic vegetation
- herbaceous upland
- herbaceous upland, ruderal
- herbaceous wetland, perennial
- herbaceous wetland, seasonal
- herbaceous wetland, seasonal, ruderal
- shrub upland
- tree upland
- tree upland, non-native
- shrub wetland (riparian)
- tree wetland (riparian)

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MILES

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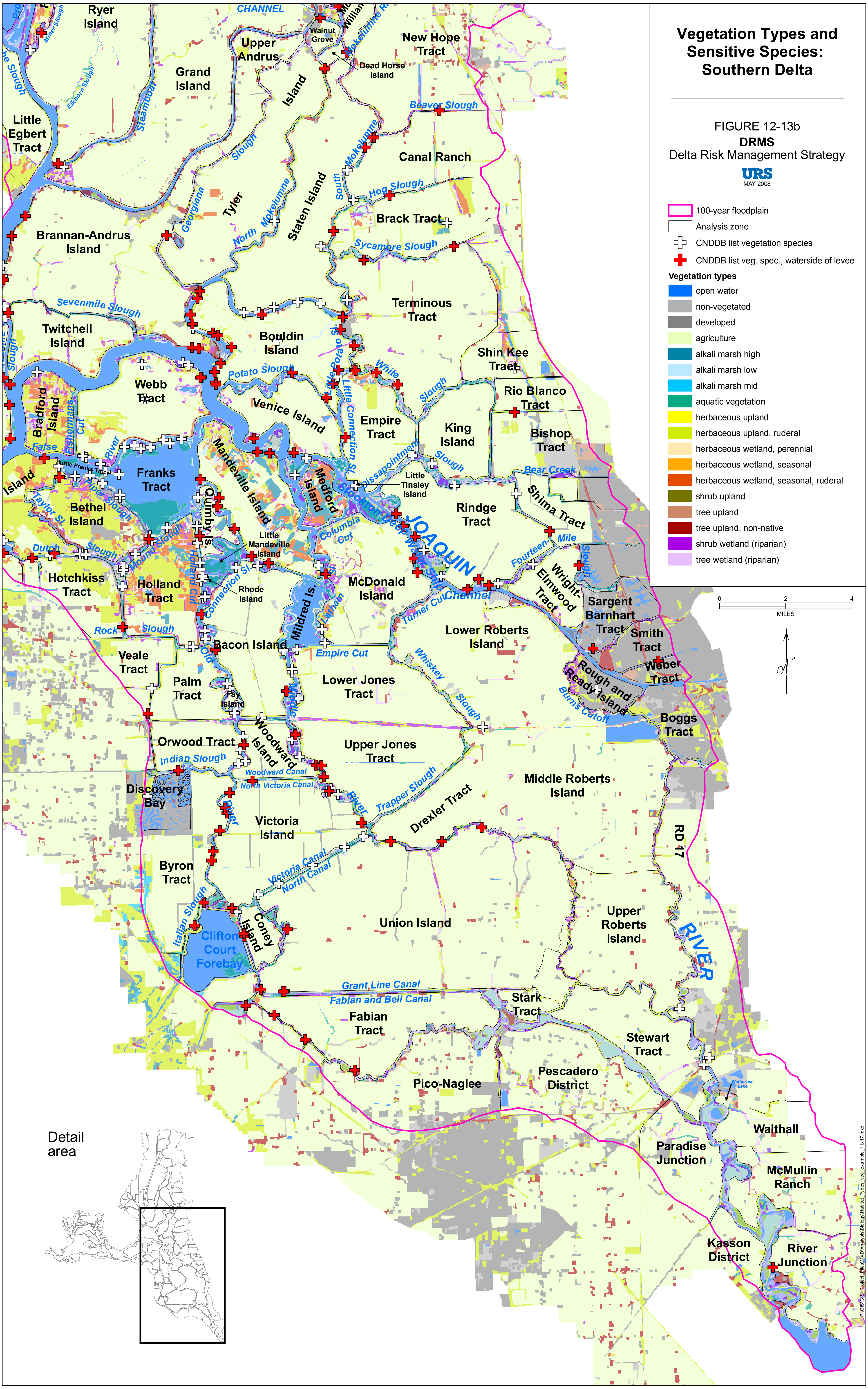
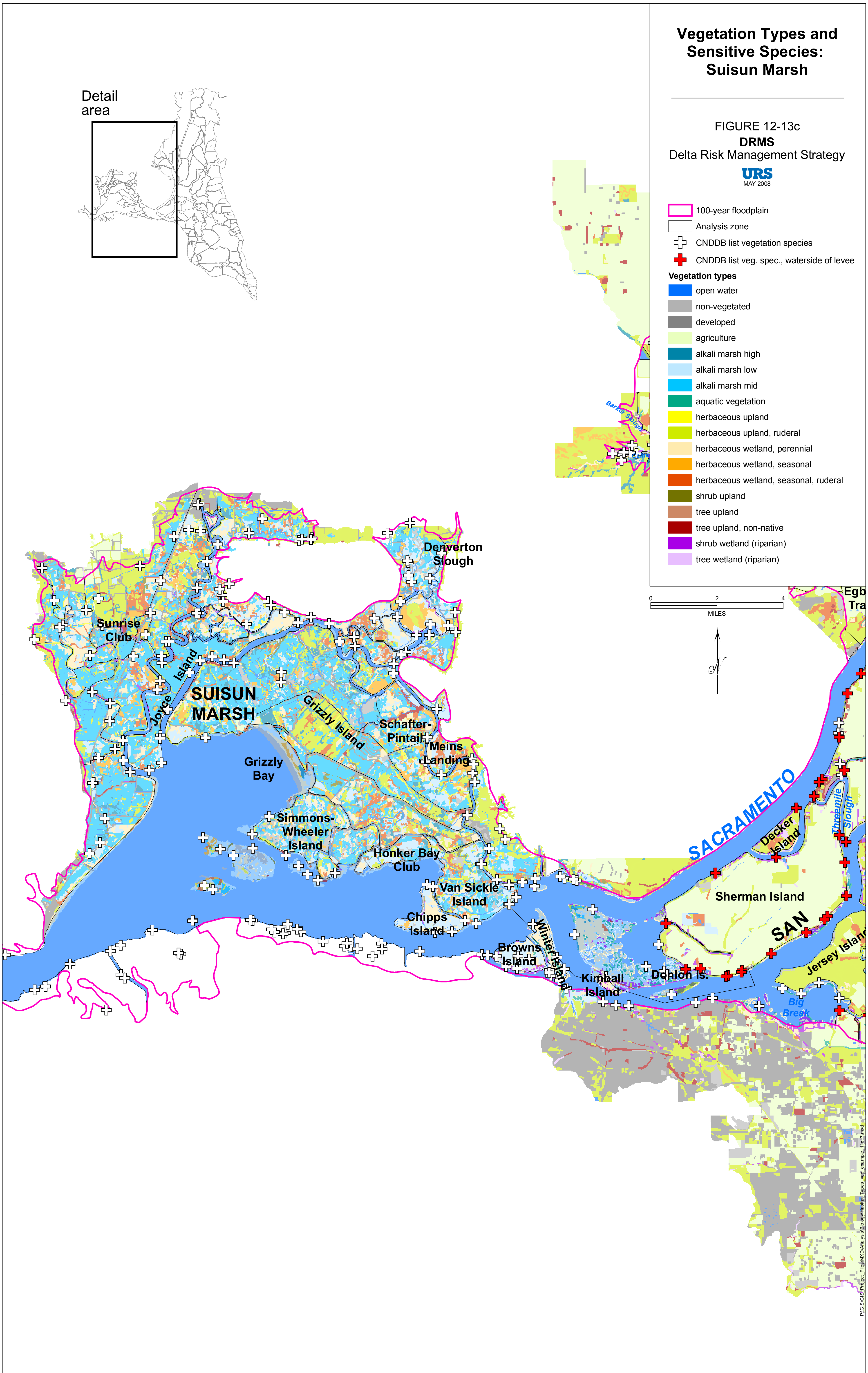

Vegetation Types and Sensitive Species: Southern Delta
FIGURE 12-13b
DRMS
Delta Risk Management Strategy
URS
MAY 2008
100-year floodplain
Analysis zone
CNDDB list vegetation species
CNDDB list veg. spec., waterside of levee
Vegetation types
open water
non-vegetated
developed
agriculture
alkali marsh high
alkali marsh low
alkali marsh mid
aquatic vegetation
herbaceous upland
herbaceous upland, ruderal
herbaceous wetland, perennial
herbaceous wetland, seasonal
herbaceous wetland, seasonal, ruderal
shrub upland
tree upland
tree upland, non-native
shrub wetland (riparian)
tree wetland (riparian)
0
2
4
MILES
N
Detail area
Ryer Island
Upper Andrus
Walnut Grove
Grand Island
New Hope Tract
Dead Horse Island
Little Egbert Tract
Canal Ranch
Brack Tract
Tyler Island
Staten Island
Brannan-Andrus Island
Terminous Tract
Twitchell Island
Bouldin Island
Shin Kee Tract
Webb Tract
Rio Blanco Tract
Venice Island
Empire Tract
King Island
Bishop Tract
Bradford Island
Franks Tract
Mandeville Island
Medford Island
Little Tinsley Island
Rindge Tract
Shima Tract
Bethel Island
Quimby Is.
Little Mandeville Island
JOAQUIN
Hotchkiss Tract
Holland Tract
Rhode Island
McDonald Island
Wright-Elmwood Tract
Sargent Barnhart Tract
Mildred Is.
Lower Roberts Island
Smith Tract
Weber Tract
Veale Tract
Bacon Island
Rough and Ready Island
Palm Tract
Fay Island
Lower Jones Tract
Boggs Tract
Orwood Tract
Woodward Island
Upper Jones Tract
Discovery Bay
Middle Roberts Island
Victoria Island
Drexler Tract
RD 17
Byron Tract
Union Island
Upper Roberts Island
Clifton Court Forebay
Coney Island
RIVER
Fabian Tract
Stark Tract
Stewart Tract
Pico-Naglee
Pescadero District
Walthall
Paradise Junction
McMullin Ranch
Kasson District
River Junction
CHANNEL
Steamboat
Elkhorn Slough
Miner Slough
Georgiana
Slough
Beaver Slough
South Mokelumne
Hog Slough
North Mokelumne
Sycamore Slough
Sevenmile Slough
Potato Slough
White Slough
Little Potato Sl.
Little Connection Sl.
Disappointment Slough
Bear Creek
Fourteen Mile Slough
False River
Fishermans Cut
Little Franks Tract
Piper Slough
Taylor Sl.
Dutch Slough
Sand Mound Slough
Holland Cut
Connection Sl.
Columbia Cut
Stockton Deep Water Ship Channel
Turner Cut
Latham Sl.
Rock Slough
Empire Cut
Whiskey Slough
Burns Cutoff
Middle River
Indian Slough
Woodward Canal
North Victoria Canal
Old River
Trapper Slough
Victoria Canal
North Canal
Italian Slough
Grant Line Canal
Fabian and Bell Canal
Wetherbee Lake



Vegetation Types and Sensitive Species: Suisun Marsh

FIGURE 12-13c
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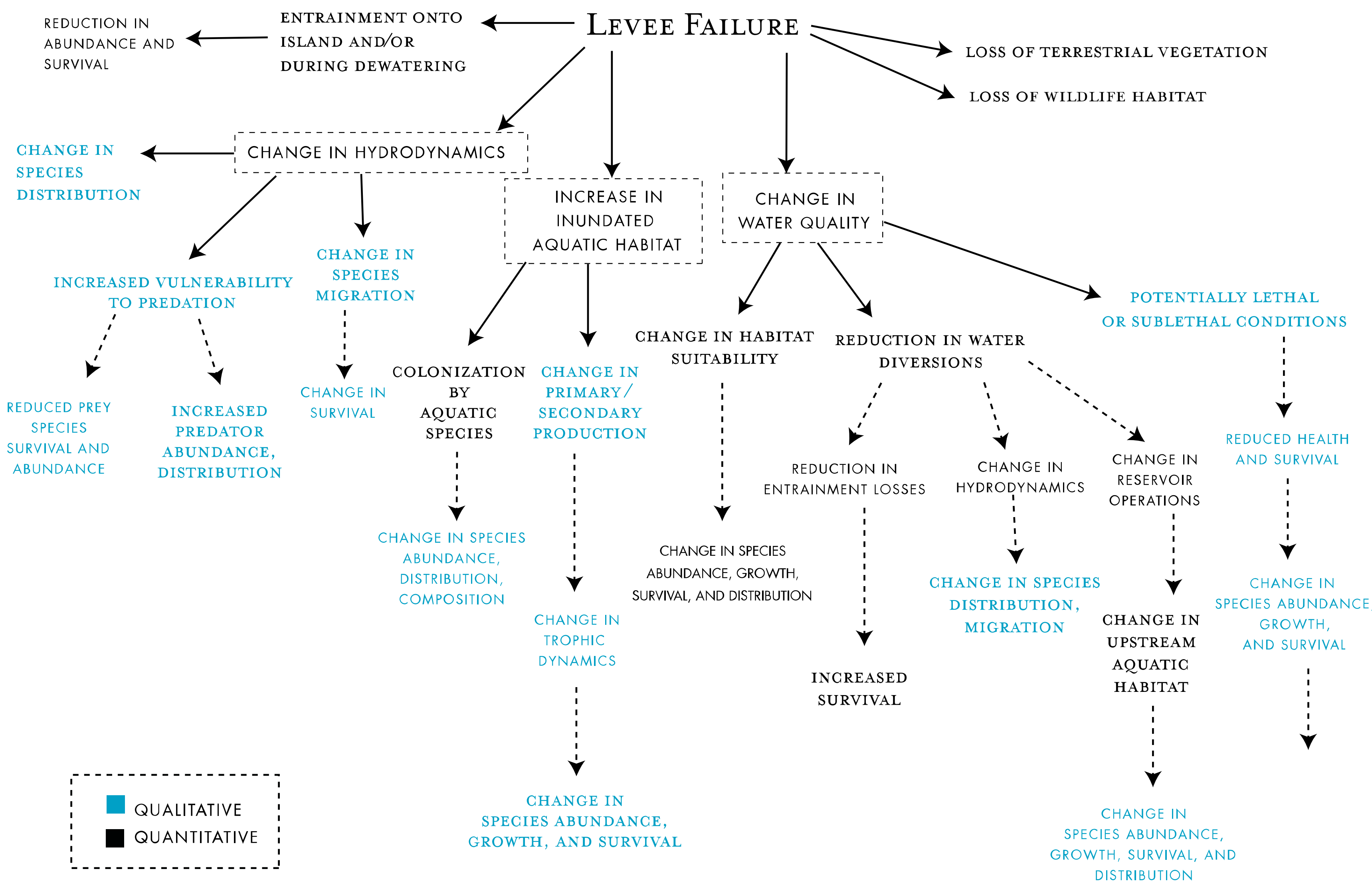


Figure 12–14 Conceptual model of aquatic ecosystem impact mechanisms

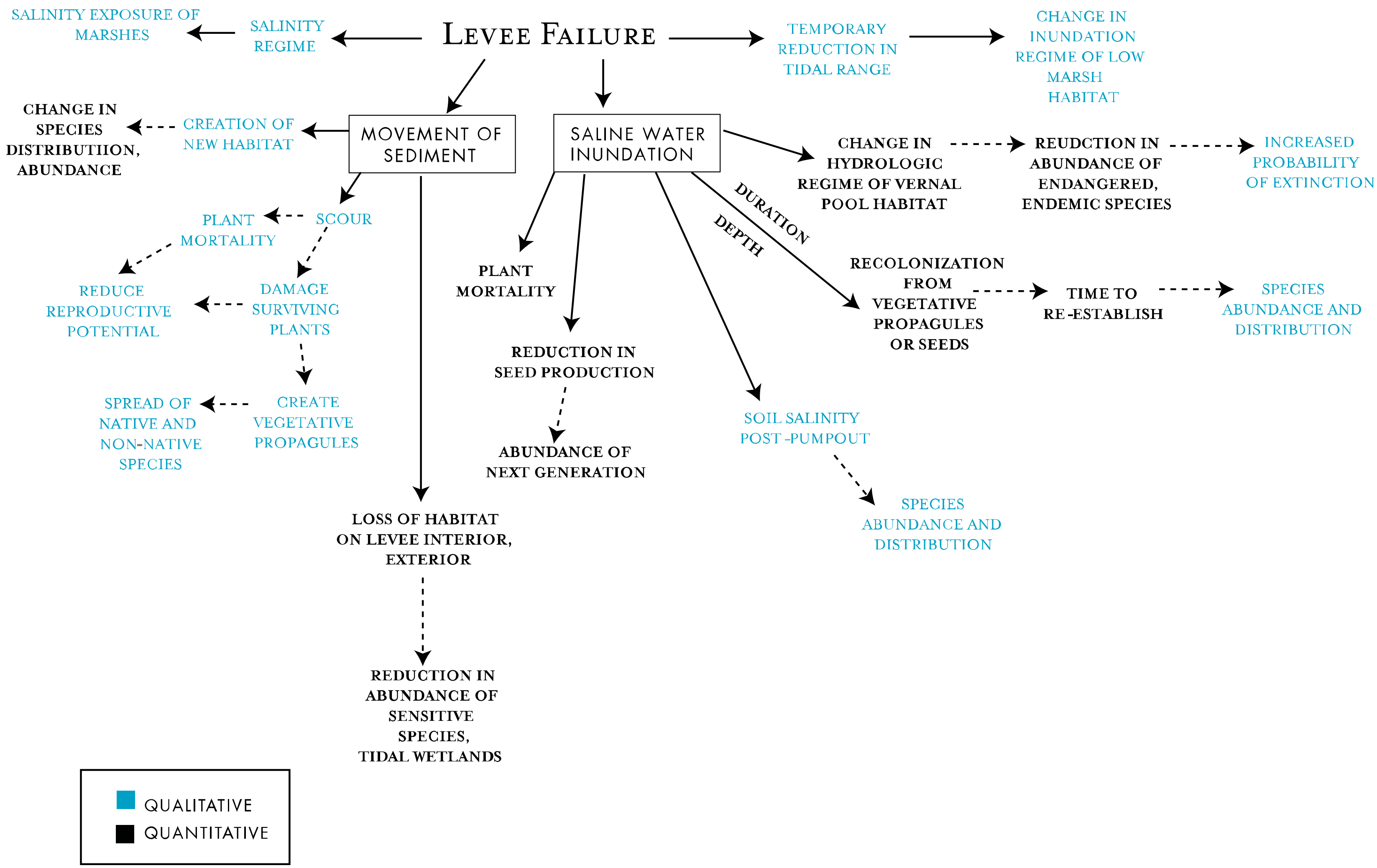
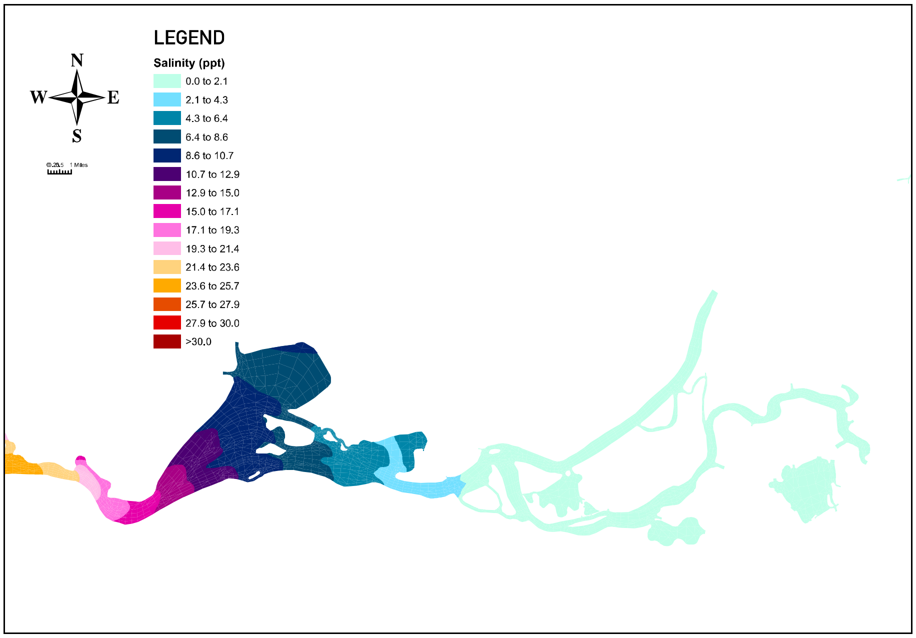
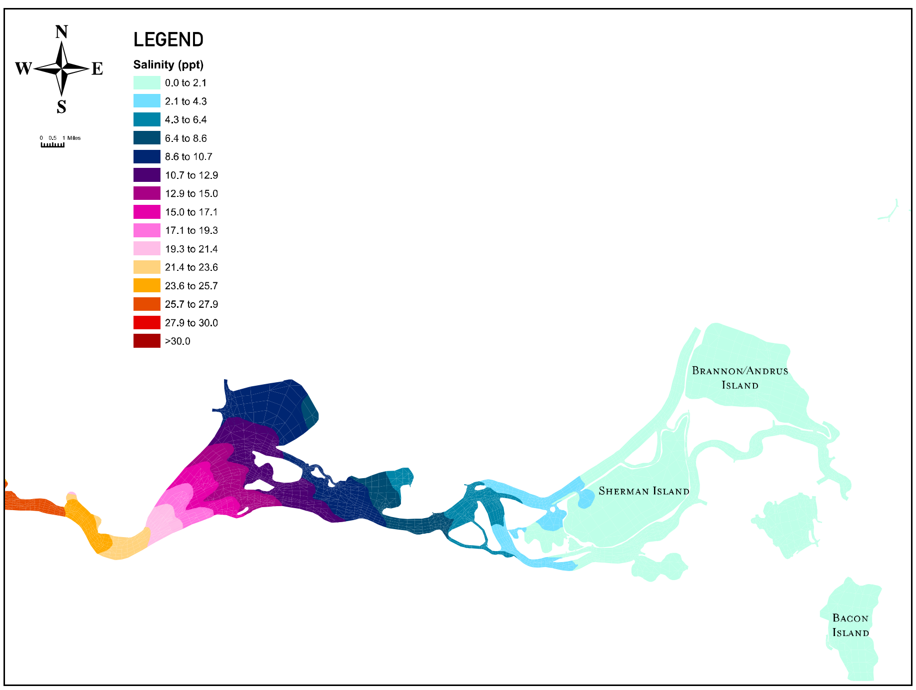


Figure 12–15 Conceptual model of impacts of levee breach on vegetation



(A)



(B)

Figure 12–16 Example of salinity changes after levee-failure

Panel (A) represents baseline salinities on a hypothetical July 2 (based on 1992 hydrology). Panel (B) represents changes in salinity conditions two hours after the failure of three levees in the Delta (RMA 2006).

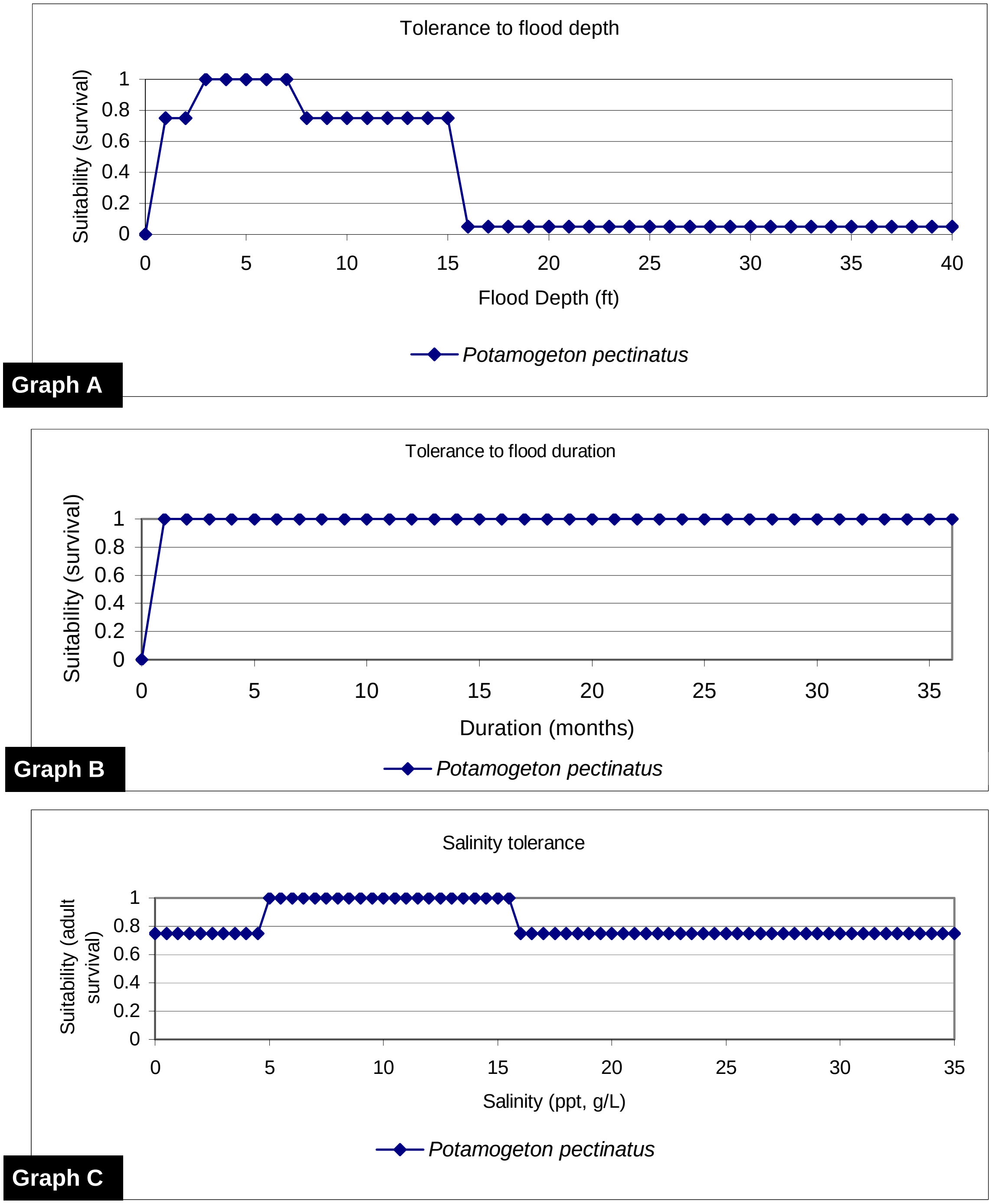
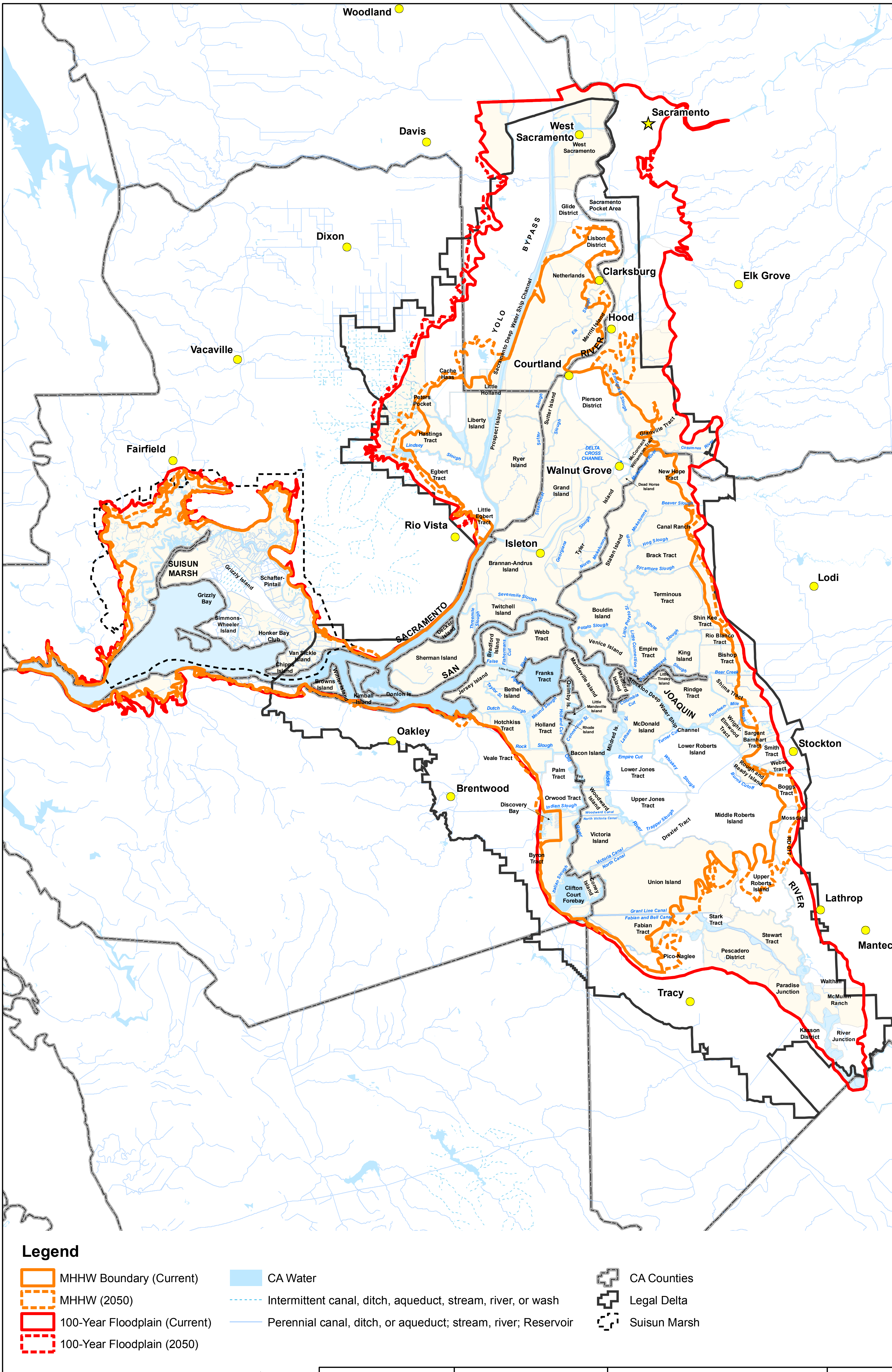


Figure 12–17 Tolerance of focal species (pondweed [*Potamogeton pectinatus*]) to flood depth, flood duration, and salinity



DRMS

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MHHW and 100-Year Flood Boundaries

Figure 12-18

Appendix 12A

Flood Routing Analysis

APPENDIX A

INUNDATION ANALYSIS FOR LEVEE BREACH ON DELTA ISLANDS

A.1 PURPOSE AND SCOPE

The purpose of this study is to determine the depth and velocity of flow on a flooded Delta Island due to failure of a surrounding levee. This information is used in the calculations of probability of fatalities due to levee failure. Two failure modes were analyzed; a sudden failure due to a seismic event and a slower failure due to a flood event.

This report describes the breach modeling and flood wave routing analyses that were completed for preparation of the inundation map. It also describes the assumptions and limitations associated with the mapping results.

A.2 BREACH OUTFLOW HYDROGRAPH

Two methods are commonly used for estimating the outflow hydrograph from failure of an earthfill embankment. In one method, the outflow hydrograph is calculated from an assumed breach size, shape, and development time. The second method uses a physically based model to calculate the outflow hydrograph from embankment characteristics and sediment transport theory.

The first method was used in this study. The results of this analysis are meant to apply generally throughout the Delta and are not meant to represent the failure of a particular levee or island. The parameters that need to be specified include the time of breach formation, the final breach width, the angle or side slope of the breach, and the final breach elevation.

Two failure times were simulated. A 15-minute failure time was used to represent sudden failure due to an earthquake. A two-hour failure time was used to represent a failure due to a flood. For both cases the breach was assumed to be trapezoidal with side slopes of 1:1. The final breach bottom width was 400 feet wide with an invert at -10 feet (the same elevation as was assumed for the invert of the island).

The method used to calculate the outflow hydrograph from the breach is described in the FLDWAV Users Manual (Fread and Lewis, 1998). The major assumption is that flow through the breach can be simulated as broad-crested weir flow.

Data required to calculate the outflow hydrograph are shown in Table A-1.

Table A-1
Data and Values Used to Estimate Breach Parameters

Parameter	Unit	Symbol	Value	Comment
Height of Water over Breach	feet	h_d	20	Initial WSE minus bottom of breach elevation. Bottom of breach was assumed to be at bottom of the island.
Final Breach Width	feet	B_{avg}	400	Typical breach size from historic levee failures
Breach Formation Time	hours	τ	0.25, 2	0.25 hours was used to represent an earthquake, 2 hours was used to represent a flood.

A2.1 Dynamic Flood Routing

The outflow hydrograph from the breach was routed across the island using the FLDWAV model developed by the National Weather Service (NWS) (Fread and Lewis 1998). This model is the successor to the NWS DAMBRK model (NWS, 1988). The FLDWAV model uses an implicit finite-difference numerical scheme to solve the one-dimensional St. Venant equations. Input parameters needed by the FLDWAV model are discussed in the following paragraphs.

Channel Geometry

Two different sized island were analyzed, one 5,000 feet wide and one 10,000 feet wide. Cross-sections representing the island were assumed to be rectangular in shape. Since the flow through the breach can not immediately flow through the entire cross-section of the island (i.e., the breach is 400 feet wide, the island cross-section is 5,000 or 10,000 feet wide) the cross-sections were assumed to grow radially in size. That is, the length of the model cross-section was calculated as:

$$\text{Length} = \pi x \qquad \text{A-1}$$

Where Length is the length of the cross-section and x is the distance the cross-section is from the breach in the direction of flow. The length of the section grew at this rate until it equaled the width of the island (either 5,000 or 10,000 feet) and then remained constant.

Manning's Roughness

Mannings n roughness values were assumed to vary from 0.035 to 0.03 with the smaller values for deep water and the larger for shallow water.

Expansion and Contraction Coefficients

According to the FLDWAV user's manual (Fread and Lewis 1998), expansion coefficients should range from -0.05 to -0.75 and contraction coefficients from 0.10 to 0.40. Expansion coefficients varied from -0.75 at the breach decreasing to 0.00 at 200 feet from the breach. These were picked to help stabilize the model.

Downstream Boundary

Level pool routing was used as the downstream boundary. At the last cross-section in the model a depth-storage relationships was specified to represent the island filling with water as the flood wave reached the opposite end of the island. The results of the model near the breach are not sensitive to the downstream boundary.

Key Assumptions

- Channel geometry is assumed "fixed," meaning that changes in cross section due to erosion are not included in the model.
- Flow can be characterized by one-dimensional solutions to equations of fluid motion.
- Channel losses are negligible.

A.3 RESULTS

The FLDWAV model results are provided in Table A-2. For the loss of life calculations the maximum distances from the breach location were rounded to 1000 feet.

Table A-2 Results of Island Flooding Analysis using FLDWAV Model

		Depth x Velocity = 7 m^2/sec		Depth x Velocity =3 m^2/sec	
Initiating Event	**Island Size**	**Max. Distance from Breach Location (feet)**	**Time from Breach Initiation to Reach Max. Distance (hours)**	**Max. Distance from Breach Location (feet)**	**Time from Breach Initiation to Reach Max. Distance (hours)**
Flood	Large (10,000 feet wide)	900	1.88	1900	2.12
	Small (5,000 feet wide)	1000	3.08	whole island	reaches 2 miles in 3.3 hrs, reaches 1 mile in 2.4 hrs,
Seismic	Large (10,000 feet wide)	890	0.27	1650	0.426
	Small (5,000 feet wide)	970	0.28	whole island	reaches 1 mile in 1.6 hrs, 2 miles in 2.87 hrs

Figures A-1 and A-2 summarize the results for the flood and seismic cases respectively.

The opinions presented in this report were developed with the standard of care commonly used as state-of-the practice in the profession. No other warranties are included, either expressed or implied, in this technical memorandum. URS is not responsible for any other use of the results and analysis presented herein.

Fread, D.L., and J.M. Lewis. 1998. NWS FLDWAV Model: Theoretical Description and User Documentation. Hydrologic Research Laboratory, Office of Hydrology. National Weather Service, National Oceanic and Atmospheric Administration, Silver Spring, MD. November 28.

NWS. 1988. DAMBRK: The NWS Dam Break Flood Forecasting Model. National Weather Service, Office of Hydrology. Davis, CA. September.

Figures

Figure A-1 Depth times Velocity
2 hour breach onto large and small islands
(breach starts at time 0.5 hours, lasts 2 hours and is 400 feet wide at completion
large island is 10,000 ft wide, small island is 5,000 ft wide both islands are 3.8 miles long)

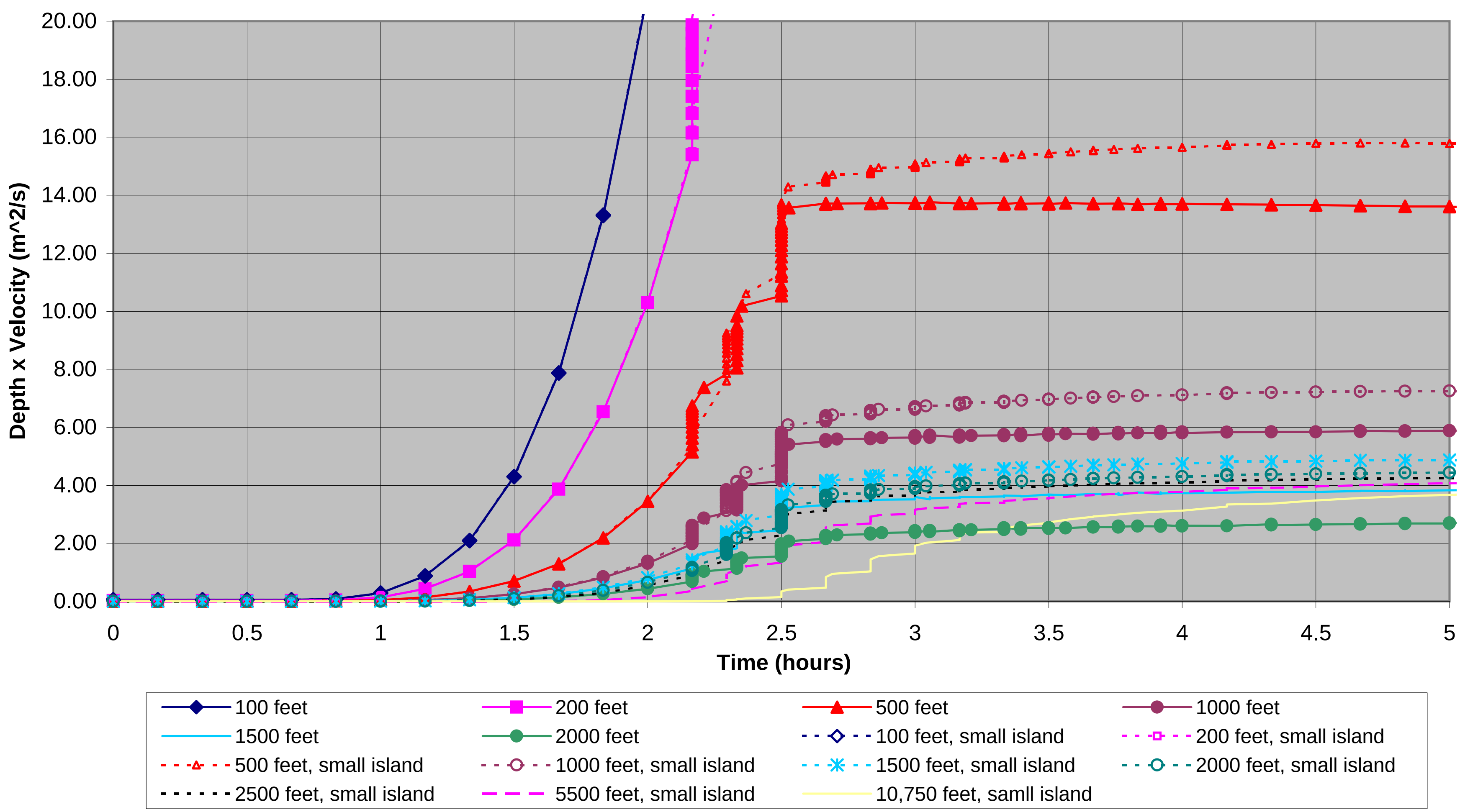
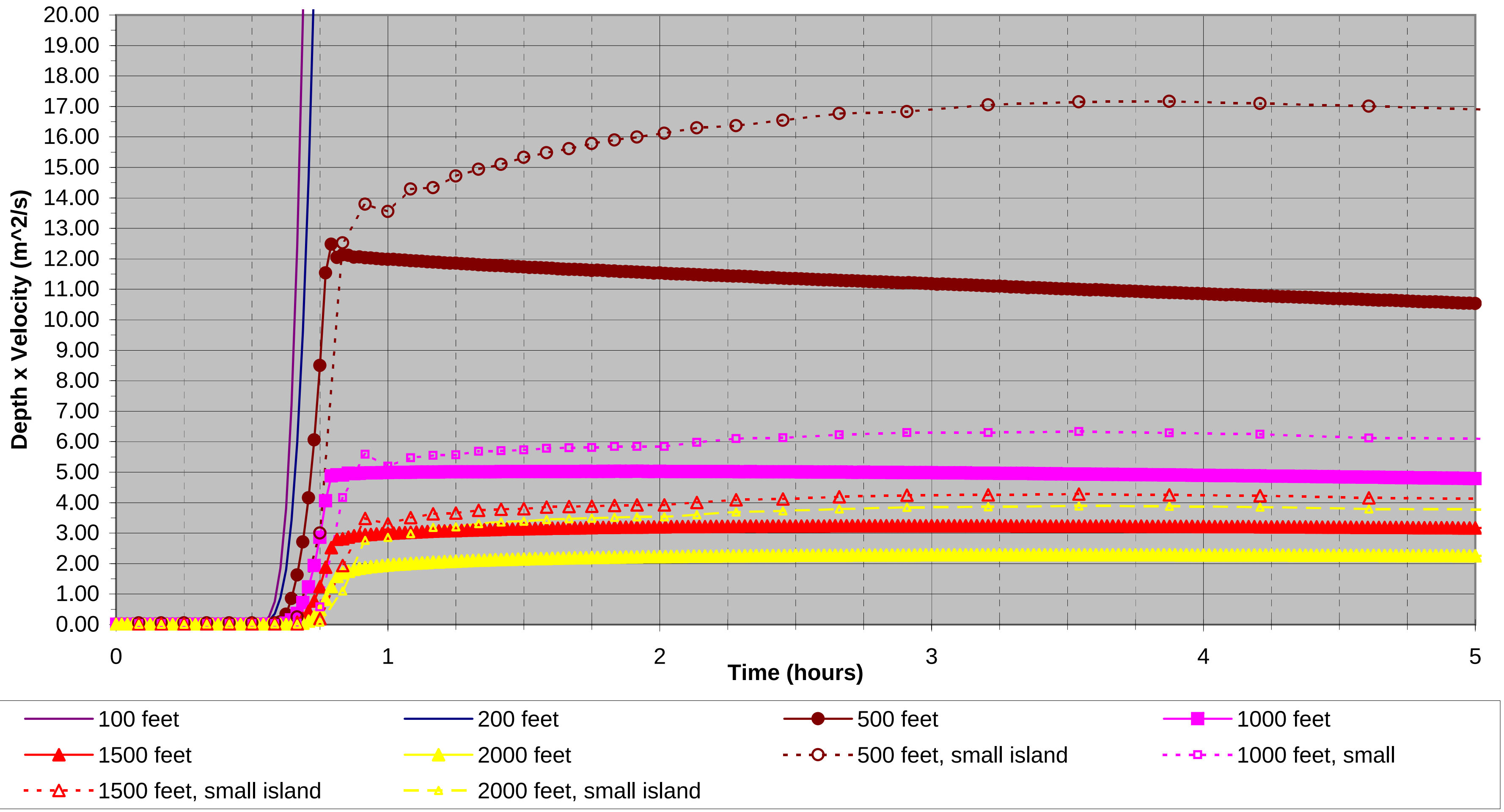


Figure A-2 Depth times Velocity
0.25 hour breach onto large and small islands
(breach starts at 0.5 hours, lasts 0.25 hours and is 400 feet wide at completion
large island is 10,000 ft wide, small island is 5,000 ft wide both islands are 3.8 miles long)



Appendix 12B

Demographic Data Used in Fatality Risk Analysis

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
1	Delta	4	Webb_Tract	Large	1	High	1	2	1	2	0
1	Delta	4	Webb_Tract	Large	2	High	1	2	1	2	0
1	Delta	4	Webb_Tract	Large	3	High	1	2	1	2	0
1	Delta	4	Webb_Tract	Large	4	High	1	1	1	1	0
1	Delta	4	Webb_Tract	Large	5	High	1	1	1	1	0
1	Delta	4	Webb_Tract	Large	6	High	1	2	1	2	0
1	Delta	4	Webb_Tract	Large	7	High	1	1	1	1	0
1	Delta	4	Webb_Tract	Large	8	High	1	2	1	2	0
1	Delta	4	Webb_Tract	Large	1	Medium	3	4	2	3	0
1	Delta	4	Webb_Tract	Large	2	Medium	3	5	2	3	0
1	Delta	4	Webb_Tract	Large	3	Medium	3	4	2	3	0
1	Delta	4	Webb_Tract	Large	4	Medium	3	4	2	3	0
1	Delta	4	Webb_Tract	Large	5	Medium	3	4	2	3	0
1	Delta	4	Webb_Tract	Large	6	Medium	3	4	2	3	0
1	Delta	4	Webb_Tract	Large	7	Medium	3	4	2	3	0
1	Delta	4	Webb_Tract	Large	8	Medium	3	4	2	3	0
2	Delta	5	Empire_Tract	Large	1	High	1	1	1	1	0
2	Delta	5	Empire_Tract	Large	2	High	1	1	1	1	0
2	Delta	5	Empire_Tract	Large	3	High	1	1	1	1	0
2	Delta	5	Empire_Tract	Large	4	High	1	1	1	1	0
2	Delta	5	Empire_Tract	Large	5	High	1	1	1	1	0
2	Delta	5	Empire_Tract	Large	6	High	1	2	1	2	0
2	Delta	5	Empire_Tract	Large	7	High	1	1	1	1	0
2	Delta	5	Empire_Tract	Large	8	High	1	2	1	2	0
2	Delta	5	Empire_Tract	Large	1	Medium	2	3	1	2	0
2	Delta	5	Empire_Tract	Large	2	Medium	2	4	1	2	0
2	Delta	5	Empire_Tract	Large	3	Medium	2	4	1	2	0
2	Delta	5	Empire_Tract	Large	4	Medium	2	4	2	3	0
2	Delta	5	Empire_Tract	Large	5	Medium	2	4	1	2	0
2	Delta	5	Empire_Tract	Large	6	Medium	3	4	2	3	0
2	Delta	5	Empire_Tract	Large	7	Medium	2	4	1	2	0
2	Delta	5	Empire_Tract	Large	8	Medium	3	4	2	3	0
3	Delta	6	Bradford_Island	Large	1	High	1	1	1	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
3	Delta	6	Bradford_Island	Large	2	High	1	2	1	2	0
3	Delta	6	Bradford_Island	Large	3	High	1	1	1	1	0
3	Delta	6	Bradford_Island	Large	4	High	1	1	1	1	0
3	Delta	6	Bradford_Island	Large	5	High	1	1	1	1	0
3	Delta	6	Bradford_Island	Large	6	High	1	1	1	1	0
3	Delta	6	Bradford_Island	Large	7	High	1	1	1	1	0
3	Delta	6	Bradford_Island	Large	8	High	1	2	1	2	0
3	Delta	6	Bradford_Island	Large	1	Medium	2	3	1	2	0
3	Delta	6	Bradford_Island	Large	2	Medium	2	3	2	2	0
3	Delta	6	Bradford_Island	Large	3	Medium	3	4	2	2	0
3	Delta	6	Bradford_Island	Large	4	Medium	3	4	2	2	0
3	Delta	6	Bradford_Island	Large	5	Medium	3	4	2	2	0
3	Delta	6	Bradford_Island	Large	6	Medium	2	4	2	2	0
3	Delta	6	Bradford_Island	Large	7	Medium	3	4	2	3	0
3	Delta	6	Bradford_Island	Large	8	Medium	2	4	2	2	0
4	Delta	7	King_Island	Large	1	High	1	2	1	2	0
4	Delta	7	King_Island	Large	2	High	1	1	1	1	0
4	Delta	7	King_Island	Large	3	High	1	1	1	1	0
4	Delta	7	King_Island	Large	4	High	1	1	1	1	0
4	Delta	7	King_Island	Large	5	High	1	1	1	1	0
4	Delta	7	King_Island	Large	6	High	1	1	1	1	0
4	Delta	7	King_Island	Large	7	High	1	1	1	1	0
4	Delta	7	King_Island	Large	8	High	1	1	1	1	0
4	Delta	7	King_Island	Large	1	Medium	2	4	2	3	0
4	Delta	7	King_Island	Large	2	Medium	2	3	1	2	0
4	Delta	7	King_Island	Large	3	Medium	2	4	2	2	0
4	Delta	7	King_Island	Large	4	Medium	2	4	2	3	0
4	Delta	7	King_Island	Large	5	Medium	2	4	1	2	0
4	Delta	7	King_Island	Large	6	Medium	3	5	2	3	0
4	Delta	7	King_Island	Large	7	Medium	2	4	2	2	0
4	Delta	7	King_Island	Large	8	Medium	2	4	1	2	0
5	Delta	9	Jersey_Island	Large	1	High	1	1	1	1	0
5	Delta	9	Jersey_Island	Large	2	High	1	2	1	2	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
5	Delta	9	Jersey_Island	Large	3	High	1	1	1	1	0
5	Delta	9	Jersey_Island	Large	4	High	1	1	1	1	0
5	Delta	9	Jersey_Island	Large	5	High	1	2	1	2	0
5	Delta	9	Jersey_Island	Large	6	High	1	1	1	1	0
5	Delta	9	Jersey_Island	Large	7	High	1	1	1	1	0
5	Delta	9	Jersey_Island	Large	8	High	1	2	1	2	0
5	Delta	9	Jersey_Island	Large	1	Medium	2	3	2	2	0
5	Delta	9	Jersey_Island	Large	2	Medium	2	4	2	2	0
5	Delta	9	Jersey_Island	Large	3	Medium	3	4	1	2	0
5	Delta	9	Jersey_Island	Large	4	Medium	3	4	2	2	0
5	Delta	9	Jersey_Island	Large	5	Medium	3	5	2	3	0
5	Delta	9	Jersey_Island	Large	6	Medium	3	4	2	3	0
5	Delta	9	Jersey_Island	Large	7	Medium	3	4	2	3	0
5	Delta	9	Jersey_Island	Large	8	Medium	3	4	2	3	0
6	Delta	10	Bethel_Island	Large	1	High	11	16	11	16	0
6	Delta	10	Bethel_Island	Large	2	High	22	32	22	32	0
6	Delta	10	Bethel_Island	Large	3	High	19	27	19	27	0
6	Delta	10	Bethel_Island	Large	4	High	14	20	14	20	0
6	Delta	10	Bethel_Island	Large	5	High	11	17	11	17	0
6	Delta	10	Bethel_Island	Large	6	High	10	15	10	15	0
6	Delta	10	Bethel_Island	Large	7	High	13	19	13	19	0
6	Delta	10	Bethel_Island	Large	8	High	13	19	13	19	0
6	Delta	10	Bethel_Island	Large	1	Medium	37	54	25	36	0
6	Delta	10	Bethel_Island	Large	2	Medium	63	90	42	60	0
6	Delta	10	Bethel_Island	Large	3	Medium	57	81	37	54	0
6	Delta	10	Bethel_Island	Large	4	Medium	35	51	23	34	0
6	Delta	10	Bethel_Island	Large	5	Medium	29	43	19	29	0
6	Delta	10	Bethel_Island	Large	6	Medium	25	36	16	24	0
6	Delta	10	Bethel_Island	Large	7	Medium	29	43	20	30	0
6	Delta	10	Bethel_Island	Large	8	Medium	34	51	23	35	0
7	Delta	11	Quimby_Island	Large	1	High	1	2	1	2	0
7	Delta	11	Quimby_Island	Large	2	High	1	1	1	1	0
7	Delta	11	Quimby_Island	Large	3	High	1	1	1	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
7	Delta	11	Quimby_Island	Large	4	High	1	1	1	1	0
7	Delta	11	Quimby_Island	Large	5	High	1	2	1	2	0
7	Delta	11	Quimby_Island	Large	6	High	1	1	1	1	0
7	Delta	11	Quimby_Island	Large	7	High	1	1	1	1	0
7	Delta	11	Quimby_Island	Large	8	High	1	1	1	1	0
7	Delta	11	Quimby_Island	Large	1	Medium	3	3	2	2	0
7	Delta	11	Quimby_Island	Large	2	Medium	2	3	1	2	0
7	Delta	11	Quimby_Island	Large	3	Medium	3	4	2	3	0
7	Delta	11	Quimby_Island	Large	4	Medium	2	3	2	2	0
7	Delta	11	Quimby_Island	Large	5	Medium	3	4	2	3	0
7	Delta	11	Quimby_Island	Large	6	Medium	3	4	2	2	0
7	Delta	11	Quimby_Island	Large	7	Medium	2	4	2	2	0
7	Delta	11	Quimby_Island	Large	8	Medium	2	3	1	2	0
8	Delta	12	McDonald_Tract	Large	1	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	2	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	3	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	4	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	5	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	6	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	7	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	8	High	1	1	1	1	0
8	Delta	12	McDonald_Tract	Large	1	Medium	3	2	2	1	0
8	Delta	12	McDonald_Tract	Large	2	Medium	3	2	2	1	0
8	Delta	12	McDonald_Tract	Large	3	Medium	2	1	1	1	0
8	Delta	12	McDonald_Tract	Large	4	Medium	2	1	1	1	0
8	Delta	12	McDonald_Tract	Large	5	Medium	2	2	2	1	0
8	Delta	12	McDonald_Tract	Large	6	Medium	3	2	2	1	0
8	Delta	12	McDonald_Tract	Large	7	Medium	2	2	1	1	0
8	Delta	12	McDonald_Tract	Large	8	Medium	2	2	2	1	0
9	Delta	13	Holland_Tract	Large	1	High	1	1	1	1	0
9	Delta	13	Holland_Tract	Large	2	High	1	1	1	1	0
9	Delta	13	Holland_Tract	Large	3	High	1	1	1	1	0
9	Delta	13	Holland_Tract	Large	4	High	1	2	1	2	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
9	Delta	13	Holland_Tract	Large	5	High	1	2	1	2	0
9	Delta	13	Holland_Tract	Large	6	High	1	2	1	2	0
9	Delta	13	Holland_Tract	Large	7	High	1	2	1	2	0
9	Delta	13	Holland_Tract	Large	8	High	1	1	1	1	0
9	Delta	13	Holland_Tract	Large	1	Medium	2	4	2	2	0
9	Delta	13	Holland_Tract	Large	2	Medium	3	4	2	2	0
9	Delta	13	Holland_Tract	Large	3	Medium	3	4	2	2	0
9	Delta	13	Holland_Tract	Large	4	Medium	3	4	2	3	0
9	Delta	13	Holland_Tract	Large	5	Medium	3	4	2	3	0
9	Delta	13	Holland_Tract	Large	6	Medium	3	4	2	3	0
9	Delta	13	Holland_Tract	Large	7	Medium	3	4	2	3	0
9	Delta	13	Holland_Tract	Large	8	Medium	3	4	2	2	0
10	Delta	14	Zone 14	Small	1	High	4	6	4	6	0
10	Delta	14	Zone 14	Small	2	High	5	6	5	6	0
10	Delta	14	Zone 14	Small	3	High	4	5	4	5	0
10	Delta	14	Zone 14	Small	4	High	3	5	3	5	0
10	Delta	14	Zone 14	Small	5	High	0	0	0	0	0
10	Delta	14	Zone 14	Small	6	High	0	0	0	0	0
10	Delta	14	Zone 14	Small	7	High	4	5	0	0	0
10	Delta	14	Zone 14	Small	8	High	4	5	4	5	0
10	Delta	14	Zone 14	Small	1	Medium	29	37	29	37	0
10	Delta	14	Zone 14	Small	2	Medium	29	37	29	37	0
10	Delta	14	Zone 14	Small	3	Medium	29	38	29	38	0
10	Delta	14	Zone 14	Small	4	Medium	30	39	30	39	0
10	Delta	14	Zone 14	Small	5	Medium	0	0	0	0	0
10	Delta	14	Zone 14	Small	6	Medium	0	0	0	0	0
10	Delta	14	Zone 14	Small	7	Medium	29	38	0	0	0
10	Delta	14	Zone 14	Small	8	Medium	29	38	29	38	0
11	Delta	15	Bacon_Island	Large	1	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	2	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	3	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	4	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	5	High	1	1	1	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
11	Delta	15	Bacon_Island	Large	6	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	7	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	8	High	1	1	1	1	0
11	Delta	15	Bacon_Island	Large	1	Medium	2	2	2	1	0
11	Delta	15	Bacon_Island	Large	2	Medium	2	2	2	1	0
11	Delta	15	Bacon_Island	Large	3	Medium	2	1	1	1	0
11	Delta	15	Bacon_Island	Large	4	Medium	2	2	1	1	0
11	Delta	15	Bacon_Island	Large	5	Medium	3	2	2	1	0
11	Delta	15	Bacon_Island	Large	6	Medium	2	2	2	1	0
11	Delta	15	Bacon_Island	Large	7	Medium	2	2	1	1	0
11	Delta	15	Bacon_Island	Large	8	Medium	2	1	1	1	0
12	Delta	16	Palm_Tract	Large	1	High	2	2	2	2	0
12	Delta	16	Palm_Tract	Large	2	High	3	2	3	2	0
12	Delta	16	Palm_Tract	Large	3	High	2	2	2	2	0
12	Delta	16	Palm_Tract	Large	4	High	3	3	3	3	0
12	Delta	16	Palm_Tract	Large	5	High	2	2	2	2	0
12	Delta	16	Palm_Tract	Large	6	High	2	2	2	2	0
12	Delta	16	Palm_Tract	Large	7	High	2	2	2	2	0
12	Delta	16	Palm_Tract	Large	8	High	2	2	2	2	0
12	Delta	16	Palm_Tract	Large	1	Medium	7	6	4	4	0
12	Delta	16	Palm_Tract	Large	2	Medium	7	6	5	4	0
12	Delta	16	Palm_Tract	Large	3	Medium	5	4	3	3	0
12	Delta	16	Palm_Tract	Large	4	Medium	8	7	6	5	0
12	Delta	16	Palm_Tract	Large	5	Medium	6	6	4	4	0
12	Delta	16	Palm_Tract	Large	6	Medium	6	6	4	4	0
12	Delta	16	Palm_Tract	Large	7	Medium	6	5	4	3	0
12	Delta	16	Palm_Tract	Large	8	Medium	6	6	4	4	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	1	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	2	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	3	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	4	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	5	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	6	High	1	1	1	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	7	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	8	High	1	1	1	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	1	Medium	2	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	2	Medium	2	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	3	Medium	3	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	4	Medium	2	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	5	Medium	3	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	6	Medium	3	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	7	Medium	3	2	2	1	0
13	Delta	17	Jones_Tract-Upper_and_Lower	Large	8	Medium	3	2	2	1	0
14	Delta	19	Woodward_Island	Large	1	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	2	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	3	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	4	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	5	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	6	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	7	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	8	High	1	1	1	1	0
14	Delta	19	Woodward_Island	Large	1	Medium	2	2	2	1	0
14	Delta	19	Woodward_Island	Large	2	Medium	2	1	1	1	0
14	Delta	19	Woodward_Island	Large	3	Medium	2	2	2	1	0
14	Delta	19	Woodward_Island	Large	4	Medium	2	2	2	1	0
14	Delta	19	Woodward_Island	Large	5	Medium	2	2	2	1	0
14	Delta	19	Woodward_Island	Large	6	Medium	3	2	2	1	0
14	Delta	19	Woodward_Island	Large	7	Medium	2	1	1	1	0
14	Delta	19	Woodward_Island	Large	8	Medium	3	2	2	1	0
15	Delta	20	Orwood_Tract	Large	1	High	2	2	2	2	0
15	Delta	20	Orwood_Tract	Large	2	High	3	2	3	2	0
15	Delta	20	Orwood_Tract	Large	3	High	2	2	2	2	0
15	Delta	20	Orwood_Tract	Large	4	High	2	2	2	2	0
15	Delta	20	Orwood_Tract	Large	5	High	2	2	2	2	0
15	Delta	20	Orwood_Tract	Large	6	High	2	2	2	2	0
15	Delta	20	Orwood_Tract	Large	7	High	2	2	2	2	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
15	Delta	20	Orwood_Tract	Large	8	High	2	2	2	2	0
15	Delta	20	Orwood_Tract	Large	1	Medium	6	6	4	4	0
15	Delta	20	Orwood_Tract	Large	2	Medium	7	6	5	4	0
15	Delta	20	Orwood_Tract	Large	3	Medium	7	6	4	4	0
15	Delta	20	Orwood_Tract	Large	4	Medium	3	3	2	2	0
15	Delta	20	Orwood_Tract	Large	5	Medium	3	3	2	2	0
15	Delta	20	Orwood_Tract	Large	6	Medium	3	3	2	2	0
15	Delta	20	Orwood_Tract	Large	7	Medium	6	6	4	4	0
15	Delta	20	Orwood_Tract	Large	8	Medium	6	6	4	4	0
16	Delta	21	Victoria_Island	Large	1	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	2	High	1	0	1	0	0
16	Delta	21	Victoria_Island	Large	3	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	4	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	5	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	6	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	7	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	8	High	1	1	1	1	0
16	Delta	21	Victoria_Island	Large	1	Medium	2	2	2	1	0
16	Delta	21	Victoria_Island	Large	2	Medium	2	1	1	1	0
16	Delta	21	Victoria_Island	Large	3	Medium	2	2	2	1	0
16	Delta	21	Victoria_Island	Large	4	Medium	2	2	2	1	0
16	Delta	21	Victoria_Island	Large	5	Medium	2	2	2	1	0
16	Delta	21	Victoria_Island	Large	6	Medium	3	2	2	1	0
16	Delta	21	Victoria_Island	Large	7	Medium	2	1	1	1	0
16	Delta	21	Victoria_Island	Large	8	Medium	3	2	2	1	0
17	Delta	32	Coney_Island	Large	1	High	2	2	2	2	0
17	Delta	32	Coney_Island	Large	2	High	2	2	2	2	0
17	Delta	32	Coney_Island	Large	3	High	2	1	2	1	0
17	Delta	32	Coney_Island	Large	4	High	1	1	1	1	0
17	Delta	32	Coney_Island	Large	5	High	1	1	1	1	0
17	Delta	32	Coney_Island	Large	6	High	2	2	2	2	0
17	Delta	32	Coney_Island	Large	7	High	2	2	2	2	0
17	Delta	32	Coney_Island	Large	8	High	3	2	3	2	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
17	Delta	32	Coney_Island	Large	1	Medium	5	5	4	3	0
17	Delta	32	Coney_Island	Large	2	Medium	6	5	4	3	0
17	Delta	32	Coney_Island	Large	3	Medium	4	4	3	3	0
17	Delta	32	Coney_Island	Large	4	Medium	4	4	3	2	0
17	Delta	32	Coney_Island	Large	5	Medium	5	4	3	3	0
17	Delta	32	Coney_Island	Large	6	Medium	6	6	4	4	0
17	Delta	32	Coney_Island	Large	7	Medium	6	6	4	4	0
17	Delta	32	Coney_Island	Large	8	Medium	6	5	4	4	0
18	Delta	62	Walnut_Grove	Small	1	High	11	12	11	12	0
18	Delta	62	Walnut_Grove	Small	2	High	10	11	10	11	0
18	Delta	62	Walnut_Grove	Small	3	High	11	11	11	11	0
18	Delta	62	Walnut_Grove	Small	4	High	10	11	10	11	0
18	Delta	62	Walnut_Grove	Small	5	High	10	11	10	11	0
18	Delta	62	Walnut_Grove	Small	6	High	12	12	12	12	0
18	Delta	62	Walnut_Grove	Small	7	High	10	10	10	10	0
18	Delta	62	Walnut_Grove	Small	8	High	11	11	11	11	0
18	Delta	62	Walnut_Grove	Small	1	Medium	128	135	128	135	0
18	Delta	62	Walnut_Grove	Small	2	Medium	129	136	129	136	0
18	Delta	62	Walnut_Grove	Small	3	Medium	128	135	128	135	0
18	Delta	62	Walnut_Grove	Small	4	Medium	129	135	129	135	0
18	Delta	62	Walnut_Grove	Small	5	Medium	129	135	129	135	0
18	Delta	62	Walnut_Grove	Small	6	Medium	127	134	127	134	0
18	Delta	62	Walnut_Grove	Small	7	Medium	129	136	129	136	0
18	Delta	62	Walnut_Grove	Small	8	Medium	128	135	128	135	0
19	Delta	63	Tyler_Island 2	Large	1	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	2	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	3	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	4	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	5	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	6	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	7	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	8	High	1	1	1	1	0
19	Delta	63	Tyler_Island 2	Large	1	Medium	4	3	2	2	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
19	Delta	63	Tyler_Island 2	Large	2	Medium	4	3	2	2	0
19	Delta	63	Tyler_Island 2	Large	3	Medium	3	3	2	2	0
19	Delta	63	Tyler_Island 2	Large	4	Medium	3	3	2	2	0
19	Delta	63	Tyler_Island 2	Large	5	Medium	3	2	2	2	0
19	Delta	63	Tyler_Island 2	Large	6	Medium	5	5	3	3	0
19	Delta	63	Tyler_Island 2	Large	7	Medium	3	3	2	2	0
19	Delta	63	Tyler_Island 2	Large	8	Medium	3	3	2	2	0
20	Delta	68	Little_Egbert_Tract	Large	1	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	2	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	3	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	4	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	5	High	0	0	0	0	0
20	Delta	68	Little_Egbert_Tract	Large	6	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	7	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	8	High	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	1	Medium	2	2	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	2	Medium	2	2	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	3	Medium	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	4	Medium	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	5	Medium	1	1	0	0	0
20	Delta	68	Little_Egbert_Tract	Large	6	Medium	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	7	Medium	1	1	1	1	0
20	Delta	68	Little_Egbert_Tract	Large	8	Medium	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	1	High	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	2	High	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	3	High	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	4	High	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	5	High	0	0	0	0	0
21	Delta	70	Egbert_Tract	Large	6	High	0	0	0	0	0
21	Delta	70	Egbert_Tract	Large	7	High	0	0	0	0	0
21	Delta	70	Egbert_Tract	Large	8	High	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	1	Medium	2	2	1	1	0
21	Delta	70	Egbert_Tract	Large	2	Medium	2	2	1	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
21	Delta	70	Egbert_Tract	Large	3	Medium	2	2	1	1	0
21	Delta	70	Egbert_Tract	Large	4	Medium	1	1	1	1	0
21	Delta	70	Egbert_Tract	Large	5	Medium	0	0	0	0	0
21	Delta	70	Egbert_Tract	Large	6	Medium	0	0	0	0	0
21	Delta	70	Egbert_Tract	Large	7	Medium	0	0	0	0	0
21	Delta	70	Egbert_Tract	Large	8	Medium	1	1	1	1	0
22	Delta	72	Peter Pocket	Large	1	High	1	1	0	0	0
22	Delta	72	Peter Pocket	Large	2	High	1	1	0	0	0
22	Delta	72	Peter Pocket	Large	3	High	1	1	1	1	0
22	Delta	72	Peter Pocket	Large	4	High	1	1	1	1	0
22	Delta	72	Peter Pocket	Large	5	High	1	1	1	1	0
22	Delta	72	Peter Pocket	Large	6	High	1	1	0	0	0
22	Delta	72	Peter Pocket	Large	7	High	1	1	0	0	0
22	Delta	72	Peter Pocket	Large	8	High	1	1	0	0	0
22	Delta	72	Peter Pocket	Large	1	Medium	3	3	0	0	0
22	Delta	72	Peter Pocket	Large	2	Medium	2	2	0	0	0
22	Delta	72	Peter Pocket	Large	3	Medium	2	2	2	2	0
22	Delta	72	Peter Pocket	Large	4	Medium	3	3	2	2	0
22	Delta	72	Peter Pocket	Large	5	Medium	2	2	2	2	0
22	Delta	72	Peter Pocket	Large	6	Medium	2	2	0	0	0
22	Delta	72	Peter Pocket	Large	7	Medium	2	2	0	0	0
22	Delta	72	Peter Pocket	Large	8	Medium	2	2	0	0	0
23	Delta	81	Zone 81	Large	1	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	2	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	3	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	4	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	5	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	6	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	7	High	1	1	0	0	0
23	Delta	81	Zone 81	Large	8	High	0	0	0	0	0
23	Delta	81	Zone 81	Large	1	Medium	2	2	0	0	0
23	Delta	81	Zone 81	Large	2	Medium	1	1	0	0	0
23	Delta	81	Zone 81	Large	3	Medium	1	1	0	0	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
23	Delta	81	Zone 81	Large	4	Medium	2	2	0	0	0
23	Delta	81	Zone 81	Large	5	Medium	1	1	0	0	0
23	Delta	81	Zone 81	Large	6	Medium	1	1	0	0	0
23	Delta	81	Zone 81	Large	7	Medium	2	2	0	0	0
23	Delta	81	Zone 81	Large	8	Medium	0	0	0	0	0
24	Delta	83	Hastings_Tract 2	Large	1	High	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	2	High	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	3	High	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	4	High	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	5	High	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	6	High	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	7	High	1	1	0	0	0
24	Delta	83	Hastings_Tract 2	Large	8	High	1	1	0	0	0
24	Delta	83	Hastings_Tract 2	Large	1	Medium	2	2	1	1	0
24	Delta	83	Hastings_Tract 2	Large	2	Medium	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	3	Medium	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	4	Medium	2	2	1	1	0
24	Delta	83	Hastings_Tract 2	Large	5	Medium	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	6	Medium	1	1	1	1	0
24	Delta	83	Hastings_Tract 2	Large	7	Medium	1	1	0	0	0
24	Delta	83	Hastings_Tract 2	Large	8	Medium	1	1	0	0	0
25	Delta	86	Terminous_Tract 1	Large	1	High	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	2	High	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	3	High	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	4	High	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	5	High	1	1	1	1	0
25	Delta	86	Terminous_Tract 1	Large	6	High	1	1	1	1	0
25	Delta	86	Terminous_Tract 1	Large	7	High	1	1	1	1	0
25	Delta	86	Terminous_Tract 1	Large	8	High	1	1	1	1	0
25	Delta	86	Terminous_Tract 1	Large	1	Medium	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	2	Medium	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	3	Medium	0	0	0	0	0
25	Delta	86	Terminous_Tract 1	Large	4	Medium	0	0	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
25	Delta	86	Terminous_Tract 1	Large	5	Medium	2	4	2	2	0
25	Delta	86	Terminous_Tract 1	Large	6	Medium	2	4	2	3	0
25	Delta	86	Terminous_Tract 1	Large	7	Medium	2	4	2	3	0
25	Delta	86	Terminous_Tract 1	Large	8	Medium	2	4	2	3	0
26	Delta	87	Terminous_Tract 2	Large	1	High	1	1	1	1	0
26	Delta	87	Terminous_Tract 2	Large	2	High	1	1	1	1	0
26	Delta	87	Terminous_Tract 2	Large	3	High	1	1	1	1	0
26	Delta	87	Terminous_Tract 2	Large	4	High	1	2	1	2	0
26	Delta	87	Terminous_Tract 2	Large	5	High	1	2	1	2	0
26	Delta	87	Terminous_Tract 2	Large	6	High	1	2	1	2	0
26	Delta	87	Terminous_Tract 2	Large	7	High	1	2	1	2	0
26	Delta	87	Terminous_Tract 2	Large	8	High	1	2	1	2	0
26	Delta	87	Terminous_Tract 2	Large	1	Medium	2	4	1	2	0
26	Delta	87	Terminous_Tract 2	Large	2	Medium	2	4	2	3	0
26	Delta	87	Terminous_Tract 2	Large	3	Medium	2	4	2	2	0
26	Delta	87	Terminous_Tract 2	Large	4	Medium	3	4	2	3	0
26	Delta	87	Terminous_Tract 2	Large	5	Medium	3	5	2	3	0
26	Delta	87	Terminous_Tract 2	Large	6	Medium	3	5	2	4	0
26	Delta	87	Terminous_Tract 2	Large	7	Medium	3	4	2	3	0
26	Delta	87	Terminous_Tract 2	Large	8	Medium	3	4	2	3	0
27	Delta	88	Cache_Haas_Tract 1	Large	1	High	0	0	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	2	High	1	1	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	3	High	1	1	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	4	High	1	1	1	1	0
27	Delta	88	Cache_Haas_Tract 1	Large	5	High	1	1	1	1	0
27	Delta	88	Cache_Haas_Tract 1	Large	6	High	1	1	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	7	High	1	1	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	8	High	0	0	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	1	Medium	0	0	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	2	Medium	2	2	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	3	Medium	2	2	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	4	Medium	2	3	2	2	0
27	Delta	88	Cache_Haas_Tract 1	Large	5	Medium	2	3	2	2	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
27	Delta	88	Cache_Haas_Tract 1	Large	6	Medium	2	3	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	7	Medium	2	2	0	0	0
27	Delta	88	Cache_Haas_Tract 1	Large	8	Medium	2	2	0	0	0
28	Delta	89	Cache_Haas_Tract 2	Large	1	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	2	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	3	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	4	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	5	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	6	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	7	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	8	High	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	1	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	2	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	3	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	4	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	5	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	6	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	7	Medium	1	1	1	1	0
28	Delta	89	Cache_Haas_Tract 2	Large	8	Medium	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	1	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	2	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	3	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	4	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	5	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	6	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	7	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	8	High	1	1	1	1	0
29	Delta	106	Lower_Roberts_Island	Small	1	Medium	4	3	4	3	0
29	Delta	106	Lower_Roberts_Island	Small	2	Medium	4	3	4	3	0
29	Delta	106	Lower_Roberts_Island	Small	3	Medium	4	3	4	3	0
29	Delta	106	Lower_Roberts_Island	Small	4	Medium	4	3	4	3	0
29	Delta	106	Lower_Roberts_Island	Small	5	Medium	4	3	4	3	0
29	Delta	106	Lower_Roberts_Island	Small	6	Medium	4	3	4	3	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
29	Delta	106	Lower_Roberts_Island	Small	7	Medium	4	3	4	3	0
29	Delta	106	Lower_Roberts_Island	Small	8	Medium	4	3	4	3	0
30	Delta	108	Hotchkiss_Tract 1	Large	1	High	1	1	1	1	0
30	Delta	108	Hotchkiss_Tract 1	Large	2	High	1	1	1	1	0
30	Delta	108	Hotchkiss_Tract 1	Large	3	High	1	1	1	1	0
30	Delta	108	Hotchkiss_Tract 1	Large	4	High	1	1	1	1	0
30	Delta	108	Hotchkiss_Tract 1	Large	5	High	1	1	0	0	0
30	Delta	108	Hotchkiss_Tract 1	Large	6	High	0	0	0	0	0
30	Delta	108	Hotchkiss_Tract 1	Large	7	High	0	0	0	0	0
30	Delta	108	Hotchkiss_Tract 1	Large	8	High	4	6	4	6	0
30	Delta	108	Hotchkiss_Tract 1	Large	1	Medium	2	4	2	2	0
30	Delta	108	Hotchkiss_Tract 1	Large	2	Medium	2	3	1	2	0
30	Delta	108	Hotchkiss_Tract 1	Large	3	Medium	2	3	2	2	0
30	Delta	108	Hotchkiss_Tract 1	Large	4	Medium	3	4	2	2	0
30	Delta	108	Hotchkiss_Tract 1	Large	5	Medium	2	3	0	0	0
30	Delta	108	Hotchkiss_Tract 1	Large	6	Medium	0	0	0	0	0
30	Delta	108	Hotchkiss_Tract 1	Large	7	Medium	0	0	0	0	0
30	Delta	108	Hotchkiss_Tract 1	Large	8	Medium	10	13	7	9	0
31	Delta	109	Hotchkiss_Tract 2	Small	1	High	4	5	4	5	0
31	Delta	109	Hotchkiss_Tract 2	Small	2	High	4	5	4	5	0
31	Delta	109	Hotchkiss_Tract 2	Small	3	High	5	6	5	6	0
31	Delta	109	Hotchkiss_Tract 2	Small	4	High	4	5	4	5	0
31	Delta	109	Hotchkiss_Tract 2	Small	5	High	0	0	0	0	0
31	Delta	109	Hotchkiss_Tract 2	Small	6	High	4	5	4	5	0
31	Delta	109	Hotchkiss_Tract 2	Small	7	High	5	6	5	6	0
31	Delta	109	Hotchkiss_Tract 2	Small	8	High	5	6	5	6	0
31	Delta	109	Hotchkiss_Tract 2	Small	1	Medium	26	34	26	34	0
31	Delta	109	Hotchkiss_Tract 2	Small	2	Medium	26	34	26	34	0
31	Delta	109	Hotchkiss_Tract 2	Small	3	Medium	25	33	25	33	0
31	Delta	109	Hotchkiss_Tract 2	Small	4	Medium	26	34	26	34	0
31	Delta	109	Hotchkiss_Tract 2	Small	5	Medium	0	0	0	0	0
31	Delta	109	Hotchkiss_Tract 2	Small	6	Medium	26	34	26	34	0
31	Delta	109	Hotchkiss_Tract 2	Small	7	Medium	25	33	25	33	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
31	Delta	109	Hotchkiss_Tract 2	Small	8	Medium	25	33	25	33	0
32	Delta	115	Upper_Roberts_Island	Large	1	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	2	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	3	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	4	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	5	High	0	0	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	6	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	7	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	8	High	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	1	Medium	2	2	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	2	Medium	2	2	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	3	Medium	2	2	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	4	Medium	3	2	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	5	Medium	1	1	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	6	Medium	3	2	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	7	Medium	2	2	0	0	0
32	Delta	115	Upper_Roberts_Island	Large	8	Medium	3	2	0	0	0
33	Delta	117	Union_Island 1	Large	1	High	1	1	1	1	0
33	Delta	117	Union_Island 1	Large	2	High	1	1	1	1	0
33	Delta	117	Union_Island 1	Large	3	High	1	1	0	0	0
33	Delta	117	Union_Island 1	Large	4	High	1	1	0	0	0
33	Delta	117	Union_Island 1	Large	5	High	1	1	1	1	0
33	Delta	117	Union_Island 1	Large	6	High	1	1	1	1	0
33	Delta	117	Union_Island 1	Large	7	High	1	1	1	1	0
33	Delta	117	Union_Island 1	Large	8	High	1	1	1	1	0
33	Delta	117	Union_Island 1	Large	1	Medium	2	2	2	1	0
33	Delta	117	Union_Island 1	Large	2	Medium	3	2	2	1	0
33	Delta	117	Union_Island 1	Large	3	Medium	3	2	0	0	0
33	Delta	117	Union_Island 1	Large	4	Medium	2	2	0	0	0
33	Delta	117	Union_Island 1	Large	5	Medium	2	2	2	1	0
33	Delta	117	Union_Island 1	Large	6	Medium	2	2	2	1	0
33	Delta	117	Union_Island 1	Large	7	Medium	2	2	1	1	0
33	Delta	117	Union_Island 1	Large	8	Medium	2	2	2	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
34	Delta	126	Pico_Naglee_Tract	Large	1	High	3	5	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	2	High	3	5	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	3	High	35	12	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	4	High	0	0	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	5	High	0	0	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	6	High	0	0	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	7	High	3	3	3	3	0
34	Delta	126	Pico_Naglee_Tract	Large	8	High	3	4	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	1	Medium	7	12	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	2	Medium	6	10	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	3	Medium	92	32	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	4	Medium	0	0	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	5	Medium	0	0	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	6	Medium	0	0	0	0	0
34	Delta	126	Pico_Naglee_Tract	Large	7	Medium	6	6	4	4	0
34	Delta	126	Pico_Naglee_Tract	Large	8	Medium	6	10	0	0	0
35	Delta	127	Byron_Tract 1	Large	1	High	3	2	3	2	0
35	Delta	127	Byron_Tract 1	Large	2	High	2	2	2	2	0
35	Delta	127	Byron_Tract 1	Large	3	High	1	1	1	1	0
35	Delta	127	Byron_Tract 1	Large	4	High	5	5	5	5	0
35	Delta	127	Byron_Tract 1	Large	5	High	5	5	5	5	0
35	Delta	127	Byron_Tract 1	Large	6	High	0	0	0	0	0
35	Delta	127	Byron_Tract 1	Large	7	High	0	0	0	0	0
35	Delta	127	Byron_Tract 1	Large	8	High	5	5	5	5	0
35	Delta	127	Byron_Tract 1	Large	1	Medium	7	6	4	4	0
35	Delta	127	Byron_Tract 1	Large	2	Medium	5	4	3	3	0
35	Delta	127	Byron_Tract 1	Large	3	Medium	10	10	6	6	0
35	Delta	127	Byron_Tract 1	Large	4	Medium	10	10	7	7	0
35	Delta	127	Byron_Tract 1	Large	5	Medium	10	10	7	7	0
35	Delta	127	Byron_Tract 1	Large	6	Medium	0	0	0	0	0
35	Delta	127	Byron_Tract 1	Large	7	Medium	0	0	0	0	0
35	Delta	127	Byron_Tract 1	Large	8	Medium	12	13	8	8	0
36	Delta	129	Veale_Tract 1	Large	1	High	2	2	2	2	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
36	Delta	129	Veale_Tract 1	Large	2	High	2	2	2	2	0
36	Delta	129	Veale_Tract 1	Large	3	High	2	2	2	2	0
36	Delta	129	Veale_Tract 1	Large	4	High	2	2	2	2	0
36	Delta	129	Veale_Tract 1	Large	5	High	2	2	2	2	0
36	Delta	129	Veale_Tract 1	Large	6	High	0	0	0	0	0
36	Delta	129	Veale_Tract 1	Large	7	High	0	0	0	0	0
36	Delta	129	Veale_Tract 1	Large	8	High	5	6	5	6	0
36	Delta	129	Veale_Tract 1	Large	1	Medium	7	7	5	4	0
36	Delta	129	Veale_Tract 1	Large	2	Medium	6	6	4	4	0
36	Delta	129	Veale_Tract 1	Large	3	Medium	6	6	4	4	0
36	Delta	129	Veale_Tract 1	Large	4	Medium	6	5	4	4	0
36	Delta	129	Veale_Tract 1	Large	5	Medium	6	6	4	4	0
36	Delta	129	Veale_Tract 1	Large	6	Medium	0	0	0	0	0
36	Delta	129	Veale_Tract 1	Large	7	Medium	0	0	0	0	0
36	Delta	129	Veale_Tract 1	Large	8	Medium	12	16	8	10	0
37	Delta	141	Merritt Island	Large	1	High	1	1	0	0	0
37	Delta	141	Merritt Island	Large	2	High	1	1	0	0	0
37	Delta	141	Merritt Island	Large	3	High	1	1	0	0	0
37	Delta	141	Merritt Island	Large	4	High	1	1	0	0	0
37	Delta	141	Merritt Island	Large	5	High	1	1	0	0	0
37	Delta	141	Merritt Island	Large	6	High	1	1	1	1	0
37	Delta	141	Merritt Island	Large	7	High	1	0	1	0	0
37	Delta	141	Merritt Island	Large	8	High	1	1	1	1	0
37	Delta	141	Merritt Island	Large	1	Medium	3	2	0	0	0
37	Delta	141	Merritt Island	Large	2	Medium	2	1	0	0	0
37	Delta	141	Merritt Island	Large	3	Medium	2	1	0	0	0
37	Delta	141	Merritt Island	Large	4	Medium	2	1	0	0	0
37	Delta	141	Merritt Island	Large	5	Medium	2	1	0	0	0
37	Delta	141	Merritt Island	Large	6	Medium	3	2	2	1	0
37	Delta	141	Merritt Island	Large	7	Medium	2	1	1	1	0
37	Delta	141	Merritt Island	Large	8	Medium	2	1	1	1	0
38	Delta	142	Netherlands 2	Large	1	High	1	2	0	0	0
38	Delta	142	Netherlands 2	Large	2	High	1	2	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
38	Delta	142	Netherlands 2	Large	3	High	1	1	1	1	0
38	Delta	142	Netherlands 2	Large	4	High	1	1	1	1	0
38	Delta	142	Netherlands 2	Large	5	High	1	1	1	1	0
38	Delta	142	Netherlands 2	Large	6	High	1	1	1	1	0
38	Delta	142	Netherlands 2	Large	7	High	1	1	1	1	0
38	Delta	142	Netherlands 2	Large	8	High	1	2	0	0	0
38	Delta	142	Netherlands 2	Large	1	Medium	3	4	0	0	0
38	Delta	142	Netherlands 2	Large	2	Medium	4	5	0	0	0
38	Delta	142	Netherlands 2	Large	3	Medium	3	2	2	1	0
38	Delta	142	Netherlands 2	Large	4	Medium	3	2	2	1	0
38	Delta	142	Netherlands 2	Large	5	Medium	2	2	1	1	0
38	Delta	142	Netherlands 2	Large	6	Medium	2	1	1	1	0
38	Delta	142	Netherlands 2	Large	7	Medium	2	1	1	1	0
38	Delta	142	Netherlands 2	Large	8	Medium	3	3	0	0	0
39	Delta	143	Rindge_Tract	Large	1	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	2	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	3	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	4	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	5	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	6	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	7	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	8	High	1	1	1	1	0
39	Delta	143	Rindge_Tract	Large	1	Medium	2	2	2	1	0
39	Delta	143	Rindge_Tract	Large	2	Medium	3	2	2	1	0
39	Delta	143	Rindge_Tract	Large	3	Medium	2	2	2	1	0
39	Delta	143	Rindge_Tract	Large	4	Medium	3	2	2	1	0
39	Delta	143	Rindge_Tract	Large	5	Medium	2	1	1	1	0
39	Delta	143	Rindge_Tract	Large	6	Medium	2	1	1	1	0
39	Delta	143	Rindge_Tract	Large	7	Medium	2	2	2	1	0
39	Delta	143	Rindge_Tract	Large	8	Medium	3	2	2	1	0
40	Delta	144	Mandeville_Island	Large	1	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	2	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	3	High	1	1	1	1	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
40	Delta	144	Mandeville_Island	Large	4	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	5	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	6	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	7	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	8	High	1	1	1	1	0
40	Delta	144	Mandeville_Island	Large	1	Medium	3	2	2	1	0
40	Delta	144	Mandeville_Island	Large	2	Medium	3	2	2	1	0
40	Delta	144	Mandeville_Island	Large	3	Medium	3	2	2	1	0
40	Delta	144	Mandeville_Island	Large	4	Medium	3	2	2	1	0
40	Delta	144	Mandeville_Island	Large	5	Medium	2	2	2	1	0
40	Delta	144	Mandeville_Island	Large	6	Medium	2	1	1	1	0
40	Delta	144	Mandeville_Island	Large	7	Medium	3	2	2	1	0
40	Delta	144	Mandeville_Island	Large	8	Medium	3	2	2	1	0
41	Delta	146	Sutter Island	Large	1	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	2	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	3	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	4	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	5	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	6	High	2	2	2	2	0
41	Delta	146	Sutter Island	Large	7	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	8	High	3	3	3	3	0
41	Delta	146	Sutter Island	Large	1	Medium	7	8	5	5	0
41	Delta	146	Sutter Island	Large	2	Medium	6	7	4	5	0
41	Delta	146	Sutter Island	Large	3	Medium	7	8	5	5	0
41	Delta	146	Sutter Island	Large	4	Medium	6	7	4	4	0
41	Delta	146	Sutter Island	Large	5	Medium	8	8	5	6	0
41	Delta	146	Sutter Island	Large	6	Medium	6	7	4	4	0
41	Delta	146	Sutter Island	Large	7	Medium	6	7	4	4	0
41	Delta	146	Sutter Island	Large	8	Medium	8	8	5	6	0
42	Delta	147	Grand Island	Large	1	High	3	4	3	4	0
42	Delta	147	Grand Island	Large	2	High	3	3	3	3	0
42	Delta	147	Grand Island	Large	3	High	3	3	3	3	0
42	Delta	147	Grand Island	Large	4	High	1	1	1	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
42	Delta	147	Grand Island	Large	5	High	1	1	1	1	0
42	Delta	147	Grand Island	Large	6	High	1	1	1	1	0
42	Delta	147	Grand Island	Large	7	High	2	2	2	2	0
42	Delta	147	Grand Island	Large	8	High	3	3	3	3	0
42	Delta	147	Grand Island	Large	1	Medium	9	10	6	7	0
42	Delta	147	Grand Island	Large	2	Medium	7	8	5	5	0
42	Delta	147	Grand Island	Large	3	Medium	7	7	4	5	0
42	Delta	147	Grand Island	Large	4	Medium	3	3	2	2	0
42	Delta	147	Grand Island	Large	5	Medium	3	3	2	2	0
42	Delta	147	Grand Island	Large	6	Medium	4	3	2	2	0
42	Delta	147	Grand Island	Large	7	Medium	5	5	3	4	0
42	Delta	147	Grand Island	Large	8	Medium	7	8	5	5	0
43	Delta	148	Zone 148	Large	1	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	2	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	3	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	4	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	5	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	6	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	7	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	8	High	1	1	0	0	0
43	Delta	148	Zone 148	Large	1	Medium	3	3	0	0	0
43	Delta	148	Zone 148	Large	2	Medium	2	2	0	0	0
43	Delta	148	Zone 148	Large	3	Medium	2	2	0	0	0
43	Delta	148	Zone 148	Large	4	Medium	2	2	0	0	0
43	Delta	148	Zone 148	Large	5	Medium	2	2	0	0	0
43	Delta	148	Zone 148	Large	6	Medium	3	2	0	0	0
43	Delta	148	Zone 148	Large	7	Medium	2	2	0	0	0
43	Delta	148	Zone 148	Large	8	Medium	2	2	0	0	0
44	Delta	149	Pierson_Tract	Large	1	High	3	3	0	0	0
44	Delta	149	Pierson_Tract	Large	2	High	3	3	0	0	0
44	Delta	149	Pierson_Tract	Large	3	High	3	3	3	3	0
44	Delta	149	Pierson_Tract	Large	4	High	3	3	3	3	0
44	Delta	149	Pierson_Tract	Large	5	High	3	3	3	3	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
44	Delta	149	Pierson_Tract	Large	6	High	3	3	3	3	0
44	Delta	149	Pierson_Tract	Large	7	High	3	3	3	3	0
44	Delta	149	Pierson_Tract	Large	8	High	3	3	3	3	0
44	Delta	149	Pierson_Tract	Large	1	Medium	6	6	0	0	0
44	Delta	149	Pierson_Tract	Large	2	Medium	7	6	0	0	0
44	Delta	149	Pierson_Tract	Large	3	Medium	7	7	5	4	0
44	Delta	149	Pierson_Tract	Large	4	Medium	7	7	5	5	0
44	Delta	149	Pierson_Tract	Large	5	Medium	7	7	5	4	0
44	Delta	149	Pierson_Tract	Large	6	Medium	7	7	5	4	0
44	Delta	149	Pierson_Tract	Large	7	Medium	7	7	5	5	0
44	Delta	149	Pierson_Tract	Large	8	Medium	7	6	4	4	0
45	Delta	150	Venice_Island	Large	1	High	1	1	1	1	0
45	Delta	150	Venice_Island	Large	2	High	1	1	1	1	0
45	Delta	150	Venice_Island	Large	3	High	1	2	1	2	0
45	Delta	150	Venice_Island	Large	4	High	1	2	1	2	0
45	Delta	150	Venice_Island	Large	5	High	1	1	1	1	0
45	Delta	150	Venice_Island	Large	6	High	1	1	1	1	0
45	Delta	150	Venice_Island	Large	7	High	1	1	1	1	0
45	Delta	150	Venice_Island	Large	8	High	1	2	1	2	0
45	Delta	150	Venice_Island	Large	1	Medium	2	3	1	2	0
45	Delta	150	Venice_Island	Large	2	Medium	2	4	2	3	0
45	Delta	150	Venice_Island	Large	3	Medium	2	4	1	2	0
45	Delta	150	Venice_Island	Large	4	Medium	2	4	2	3	0
45	Delta	150	Venice_Island	Large	5	Medium	2	4	2	3	0
45	Delta	150	Venice_Island	Large	6	Medium	2	4	1	2	0
45	Delta	150	Venice_Island	Large	7	Medium	2	4	1	2	0
45	Delta	150	Venice_Island	Large	8	Medium	2	3	1	2	0
46	Delta	152	Medford_Island	Large	1	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	2	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	3	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	4	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	5	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	6	High	1	1	1	1	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
46	Delta	152	Medford_Island	Large	7	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	8	High	1	1	1	1	0
46	Delta	152	Medford_Island	Large	1	Medium	2	1	1	1	0
46	Delta	152	Medford_Island	Large	2	Medium	2	2	2	1	0
46	Delta	152	Medford_Island	Large	3	Medium	2	1	1	1	0
46	Delta	152	Medford_Island	Large	4	Medium	2	1	1	1	0
46	Delta	152	Medford_Island	Large	5	Medium	2	1	1	1	0
46	Delta	152	Medford_Island	Large	6	Medium	3	2	2	1	0
46	Delta	152	Medford_Island	Large	7	Medium	2	2	2	1	0
46	Delta	152	Medford_Island	Large	8	Medium	2	2	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	1	High	1	1	0	0	0
47	Delta	153	Rough_and_Ready_Island	Large	2	High	1	1	0	0	0
47	Delta	153	Rough_and_Ready_Island	Large	3	High	1	1	0	0	0
47	Delta	153	Rough_and_Ready_Island	Large	4	High	1	1	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	5	High	1	1	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	6	High	1	1	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	7	High	1	1	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	8	High	1	1	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	1	Medium	2	2	0	0	0
47	Delta	153	Rough_and_Ready_Island	Large	2	Medium	2	2	0	0	0
47	Delta	153	Rough_and_Ready_Island	Large	3	Medium	2	2	0	0	0
47	Delta	153	Rough_and_Ready_Island	Large	4	Medium	2	1	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	5	Medium	3	2	2	1	0
47	Delta	153	Rough_and_Ready_Island	Large	6	Medium	2	2	1	1	0
47	Delta	153	Rough_and_Ready_Island	Large	7	Medium	2	2	2	1	0
47	Delta	153	Rough_and_Ready_Island	Large	8	Medium	3	2	2	1	0
48	Delta	154	Middle_Roberts_Island	Large	1	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	2	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	3	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	4	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	5	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	6	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	7	High	1	1	1	1	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
48	Delta	154	Middle_Roberts_Island	Large	8	High	1	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	1	Medium	3	2	2	1	0
48	Delta	154	Middle_Roberts_Island	Large	2	Medium	2	1	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	3	Medium	3	2	2	1	0
48	Delta	154	Middle_Roberts_Island	Large	4	Medium	3	2	2	1	0
48	Delta	154	Middle_Roberts_Island	Large	5	Medium	2	2	2	1	0
48	Delta	154	Middle_Roberts_Island	Large	6	Medium	2	2	2	1	0
48	Delta	154	Middle_Roberts_Island	Large	7	Medium	2	2	1	1	0
48	Delta	154	Middle_Roberts_Island	Large	8	Medium	4	3	3	2	0
49	Delta	157	Smith_Tract	Large	1	High	236	329	0	0	0
49	Delta	157	Smith_Tract	Large	2	High	0	0	0	0	0
49	Delta	157	Smith_Tract	Large	3	High	0	0	0	0	0
49	Delta	157	Smith_Tract	Large	4	High	216	395	0	0	0
49	Delta	157	Smith_Tract	Large	5	High	326	429	0	0	0
49	Delta	157	Smith_Tract	Large	6	High	48	69	0	0	0
49	Delta	157	Smith_Tract	Large	7	High	59	87	0	0	0
49	Delta	157	Smith_Tract	Large	8	High	218	271	0	0	0
49	Delta	157	Smith_Tract	Large	1	Medium	590	764	0	0	0
49	Delta	157	Smith_Tract	Large	2	Medium	0	0	0	0	0
49	Delta	157	Smith_Tract	Large	3	Medium	0	0	0	0	0
49	Delta	157	Smith_Tract	Large	4	Medium	827	1176	0	0	0
49	Delta	157	Smith_Tract	Large	5	Medium	611	810	0	0	0
49	Delta	157	Smith_Tract	Large	6	Medium	129	189	0	0	0
49	Delta	157	Smith_Tract	Large	7	Medium	264	402	0	0	0
49	Delta	157	Smith_Tract	Large	8	Medium	581	679	0	0	0
50	Delta	159	Boggs_Tract	Large	1	High	64	23	0	0	0
50	Delta	159	Boggs_Tract	Large	2	High	0	0	0	0	0
50	Delta	159	Boggs_Tract	Large	3	High	0	0	0	0	0
50	Delta	159	Boggs_Tract	Large	4	High	216	262	0	0	0
50	Delta	159	Boggs_Tract	Large	5	High	145	210	0	0	0
50	Delta	159	Boggs_Tract	Large	6	High	236	251	0	0	0
50	Delta	159	Boggs_Tract	Large	7	High	72	25	0	0	0
50	Delta	159	Boggs_Tract	Large	8	High	65	24	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
50	Delta	159	Boggs_Tract	Large	1	Medium	133	48	0	0	0
50	Delta	159	Boggs_Tract	Large	2	Medium	0	0	0	0	0
50	Delta	159	Boggs_Tract	Large	3	Medium	0	0	0	0	0
50	Delta	159	Boggs_Tract	Large	4	Medium	541	631	0	0	0
50	Delta	159	Boggs_Tract	Large	5	Medium	321	464	0	0	0
50	Delta	159	Boggs_Tract	Large	6	Medium	502	428	0	0	0
50	Delta	159	Boggs_Tract	Large	7	Medium	250	75	0	0	0
50	Delta	159	Boggs_Tract	Large	8	Medium	165	60	0	0	0
51	Delta	162	Zone 162	Large	1	High	2	2	2	2	0
51	Delta	162	Zone 162	Large	2	High	3	3	3	3	0
51	Delta	162	Zone 162	Large	3	High	2	2	2	2	0
51	Delta	162	Zone 162	Large	4	High	0	0	0	0	0
51	Delta	162	Zone 162	Large	5	High	0	0	0	0	0
51	Delta	162	Zone 162	Large	6	High	0	0	0	0	0
51	Delta	162	Zone 162	Large	7	High	0	0	0	0	0
51	Delta	162	Zone 162	Large	8	High	3	3	3	3	0
51	Delta	162	Zone 162	Large	1	Medium	6	6	4	4	0
51	Delta	162	Zone 162	Large	2	Medium	7	7	5	5	0
51	Delta	162	Zone 162	Large	3	Medium	6	6	4	4	0
51	Delta	162	Zone 162	Large	4	Medium	0	0	0	0	0
51	Delta	162	Zone 162	Large	5	Medium	0	0	0	0	0
51	Delta	162	Zone 162	Large	6	Medium	0	0	0	0	0
51	Delta	162	Zone 162	Large	7	Medium	0	0	0	0	0
51	Delta	162	Zone 162	Large	8	Medium	6	6	4	4	0
52	Delta	163	Fabian_Tract	Large	1	High	1	1	1	1	0
52	Delta	163	Fabian_Tract	Large	2	High	1	1	1	1	0
52	Delta	163	Fabian_Tract	Large	3	High	4	2	0	0	0
52	Delta	163	Fabian_Tract	Large	4	High	1	1	0	0	0
52	Delta	163	Fabian_Tract	Large	5	High	1	1	1	1	0
52	Delta	163	Fabian_Tract	Large	6	High	1	1	1	1	0
52	Delta	163	Fabian_Tract	Large	7	High	1	1	1	1	0
52	Delta	163	Fabian_Tract	Large	8	High	1	1	1	1	0
52	Delta	163	Fabian_Tract	Large	1	Medium	2	2	2	1	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
52	Delta	163	Fabian_Tract	Large	2	Medium	2	2	2	1	0
52	Delta	163	Fabian_Tract	Large	3	Medium	6	3	0	0	0
52	Delta	163	Fabian_Tract	Large	4	Medium	2	2	0	0	0
52	Delta	163	Fabian_Tract	Large	5	Medium	3	2	2	1	0
52	Delta	163	Fabian_Tract	Large	6	Medium	3	2	2	1	0
52	Delta	163	Fabian_Tract	Large	7	Medium	2	2	1	1	0
52	Delta	163	Fabian_Tract	Large	8	Medium	2	2	2	1	0
53	Delta	168	Libby_McNeil_Tract 1	Small	1	High	11	11	11	11	0
53	Delta	168	Libby_McNeil_Tract 1	Small	2	High	8	8	8	8	0
53	Delta	168	Libby_McNeil_Tract 1	Small	3	High	10	11	10	11	0
53	Delta	168	Libby_McNeil_Tract 1	Small	4	High	9	9	9	9	0
53	Delta	168	Libby_McNeil_Tract 1	Small	5	High	17	17	17	17	0
53	Delta	168	Libby_McNeil_Tract 1	Small	6	High	10	11	10	11	0
53	Delta	168	Libby_McNeil_Tract 1	Small	7	High	11	11	11	11	0
53	Delta	168	Libby_McNeil_Tract 1	Small	8	High	10	11	10	11	0
53	Delta	168	Libby_McNeil_Tract 1	Small	1	Medium	104	109	104	109	0
53	Delta	168	Libby_McNeil_Tract 1	Small	2	Medium	107	113	107	113	0
53	Delta	168	Libby_McNeil_Tract 1	Small	3	Medium	104	110	104	110	0
53	Delta	168	Libby_McNeil_Tract 1	Small	4	Medium	106	111	106	111	0
53	Delta	168	Libby_McNeil_Tract 1	Small	5	Medium	98	103	98	103	0
53	Delta	168	Libby_McNeil_Tract 1	Small	6	Medium	104	110	104	110	0
53	Delta	168	Libby_McNeil_Tract 1	Small	7	Medium	104	110	104	110	0
53	Delta	168	Libby_McNeil_Tract 1	Small	8	Medium	105	110	105	110	0
54	Delta	169	McCormack_Williamson_Tract	Large	1	High	1	1	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	2	High	1	1	0	0	0
54	Delta	169	McCormack_Williamson_Tract	Large	3	High	1	1	0	0	0
54	Delta	169	McCormack_Williamson_Tract	Large	4	High	1	1	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	5	High	1	1	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	6	High	1	1	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	7	High	1	1	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	8	High	1	1	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	1	Medium	2	2	2	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	2	Medium	3	2	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
54	Delta	169	McCormack_Williamson_Tract	Large	3	Medium	2	2	0	0	0
54	Delta	169	McCormack_Williamson_Tract	Large	4	Medium	2	2	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	5	Medium	2	2	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	6	Medium	2	2	2	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	7	Medium	2	2	1	1	0
54	Delta	169	McCormack_Williamson_Tract	Large	8	Medium	2	2	2	1	0
55	Delta	170	Glanville_Tract	Large	1	High	1	1	0	0	0
55	Delta	170	Glanville_Tract	Large	2	High	0	0	0	0	0
55	Delta	170	Glanville_Tract	Large	3	High	0	0	0	0	0
55	Delta	170	Glanville_Tract	Large	4	High	3	3	0	0	0
55	Delta	170	Glanville_Tract	Large	5	High	1	1	0	0	0
55	Delta	170	Glanville_Tract	Large	6	High	1	1	1	1	0
55	Delta	170	Glanville_Tract	Large	7	High	1	1	1	1	0
55	Delta	170	Glanville_Tract	Large	8	High	1	1	0	0	0
55	Delta	170	Glanville_Tract	Large	1	Medium	2	2	0	0	0
55	Delta	170	Glanville_Tract	Large	2	Medium	0	0	0	0	0
55	Delta	170	Glanville_Tract	Large	3	Medium	0	0	0	0	0
55	Delta	170	Glanville_Tract	Large	4	Medium	10	8	0	0	0
55	Delta	170	Glanville_Tract	Large	5	Medium	2	2	0	0	0
55	Delta	170	Glanville_Tract	Large	6	Medium	3	2	2	2	0
55	Delta	170	Glanville_Tract	Large	7	Medium	2	2	1	1	0
55	Delta	170	Glanville_Tract	Large	8	Medium	2	2	0	0	0
56	Delta	172	New_Hope_Tract	Large	1	High	1	1	0	0	0
56	Delta	172	New_Hope_Tract	Large	2	High	7	9	0	0	0
56	Delta	172	New_Hope_Tract	Large	3	High	0	0	0	0	0
56	Delta	172	New_Hope_Tract	Large	4	High	2	2	0	0	0
56	Delta	172	New_Hope_Tract	Large	5	High	1	1	1	1	0
56	Delta	172	New_Hope_Tract	Large	6	High	1	1	1	1	0
56	Delta	172	New_Hope_Tract	Large	7	High	1	1	1	1	0
56	Delta	172	New_Hope_Tract	Large	8	High	1	2	1	2	0
56	Delta	172	New_Hope_Tract	Large	1	Medium	2	4	0	0	0
56	Delta	172	New_Hope_Tract	Large	2	Medium	19	23	0	0	0
56	Delta	172	New_Hope_Tract	Large	3	Medium	0	0	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
56	Delta	172	New_Hope_Tract	Large	4	Medium	8	10	0	0	0
56	Delta	172	New_Hope_Tract	Large	5	Medium	2	3	1	2	0
56	Delta	172	New_Hope_Tract	Large	6	Medium	2	4	1	2	0
56	Delta	172	New_Hope_Tract	Large	7	Medium	2	4	2	3	0
56	Delta	172	New_Hope_Tract	Large	8	Medium	3	5	2	3	0
57	Delta	173	Deadhorse Island	Small	1	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	2	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	3	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	4	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	5	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	6	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	7	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	8	High	1	1	1	1	0
57	Delta	173	Deadhorse Island	Small	1	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	2	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	3	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	4	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	5	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	6	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	7	Medium	4	4	4	4	0
57	Delta	173	Deadhorse Island	Small	8	Medium	4	4	4	4	0
58	Delta	174	Staten_Island	Large	1	High	1	1	1	1	0
58	Delta	174	Staten_Island	Large	2	High	1	2	1	2	0
58	Delta	174	Staten_Island	Large	3	High	1	1	1	1	0
58	Delta	174	Staten_Island	Large	4	High	1	1	1	1	0
58	Delta	174	Staten_Island	Large	5	High	1	1	1	1	0
58	Delta	174	Staten_Island	Large	6	High	1	2	1	2	0
58	Delta	174	Staten_Island	Large	7	High	1	1	1	1	0
58	Delta	174	Staten_Island	Large	8	High	1	1	1	1	0
58	Delta	174	Staten_Island	Large	1	Medium	3	4	2	3	0
58	Delta	174	Staten_Island	Large	2	Medium	3	4	2	3	0
58	Delta	174	Staten_Island	Large	3	Medium	2	4	1	2	0
58	Delta	174	Staten_Island	Large	4	Medium	1	2	1	2	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
58	Delta	174	Staten_Island	Large	5	Medium	2	4	2	3	0
58	Delta	174	Staten_Island	Large	6	Medium	3	5	2	3	0
58	Delta	174	Staten_Island	Large	7	Medium	2	4	1	2	0
58	Delta	174	Staten_Island	Large	8	Medium	3	4	2	3	0
59	Delta	175	Canal Ranch	Large	1	High	1	1	1	1	0
59	Delta	175	Canal Ranch	Large	2	High	1	1	0	0	0
59	Delta	175	Canal Ranch	Large	3	High	0	0	0	0	0
59	Delta	175	Canal Ranch	Large	4	High	1	1	1	1	0
59	Delta	175	Canal Ranch	Large	5	High	1	1	1	1	0
59	Delta	175	Canal Ranch	Large	6	High	1	2	1	2	0
59	Delta	175	Canal Ranch	Large	7	High	1	1	1	1	0
59	Delta	175	Canal Ranch	Large	8	High	1	1	1	1	0
59	Delta	175	Canal Ranch	Large	1	Medium	2	4	2	3	0
59	Delta	175	Canal Ranch	Large	2	Medium	3	5	0	0	0
59	Delta	175	Canal Ranch	Large	3	Medium	0	0	0	0	0
59	Delta	175	Canal Ranch	Large	4	Medium	2	4	2	3	0
59	Delta	175	Canal Ranch	Large	5	Medium	2	4	2	2	0
59	Delta	175	Canal Ranch	Large	6	Medium	2	4	1	2	0
59	Delta	175	Canal Ranch	Large	7	Medium	3	4	2	3	0
59	Delta	175	Canal Ranch	Large	8	Medium	2	4	2	3	0
60	Delta	176	Brack_Tract	Large	1	High	1	2	1	2	0
60	Delta	176	Brack_Tract	Large	2	High	1	1	1	1	0
60	Delta	176	Brack_Tract	Large	3	High	1	2	0	0	0
60	Delta	176	Brack_Tract	Large	4	High	1	1	1	1	0
60	Delta	176	Brack_Tract	Large	5	High	1	1	1	1	0
60	Delta	176	Brack_Tract	Large	6	High	1	2	1	2	0
60	Delta	176	Brack_Tract	Large	7	High	1	2	1	2	0
60	Delta	176	Brack_Tract	Large	8	High	1	1	1	1	0
60	Delta	176	Brack_Tract	Large	1	Medium	3	4	2	3	0
60	Delta	176	Brack_Tract	Large	2	Medium	2	4	1	2	0
60	Delta	176	Brack_Tract	Large	3	Medium	2	4	0	0	0
60	Delta	176	Brack_Tract	Large	4	Medium	2	4	2	3	0
60	Delta	176	Brack_Tract	Large	5	Medium	2	4	1	2	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
60	Delta	176	Brack_Tract	Large	6	Medium	2	4	2	3	0
60	Delta	176	Brack_Tract	Large	7	Medium	2	4	2	2	0
60	Delta	176	Brack_Tract	Large	8	Medium	2	3	1	2	0
61	Delta	177	Bouldin_Island	Large	1	High	1	2	1	2	0
61	Delta	177	Bouldin_Island	Large	2	High	1	1	1	1	0
61	Delta	177	Bouldin_Island	Large	3	High	1	2	1	2	0
61	Delta	177	Bouldin_Island	Large	4	High	1	1	1	1	0
61	Delta	177	Bouldin_Island	Large	5	High	1	2	1	2	0
61	Delta	177	Bouldin_Island	Large	6	High	1	1	1	1	0
61	Delta	177	Bouldin_Island	Large	7	High	1	2	1	2	0
61	Delta	177	Bouldin_Island	Large	8	High	1	2	1	2	0
61	Delta	177	Bouldin_Island	Large	1	Medium	2	4	2	3	0
61	Delta	177	Bouldin_Island	Large	2	Medium	2	3	1	2	0
61	Delta	177	Bouldin_Island	Large	3	Medium	2	4	2	3	0
61	Delta	177	Bouldin_Island	Large	4	Medium	2	3	1	2	0
61	Delta	177	Bouldin_Island	Large	5	Medium	2	4	2	3	0
61	Delta	177	Bouldin_Island	Large	6	Medium	3	4	2	3	0
61	Delta	177	Bouldin_Island	Large	7	Medium	3	4	2	3	0
61	Delta	177	Bouldin_Island	Large	8	Medium	2	4	2	3	0
62	Delta	178	Brannan-Andrus Island	Large	1	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	2	High	1	1	1	1	0
62	Delta	178	Brannan-Andrus Island	Large	3	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	4	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	5	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	6	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	7	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	8	High	1	2	1	2	0
62	Delta	178	Brannan-Andrus Island	Large	1	Medium	3	5	2	3	0
62	Delta	178	Brannan-Andrus Island	Large	2	Medium	3	3	2	2	0
62	Delta	178	Brannan-Andrus Island	Large	3	Medium	4	6	3	4	0
62	Delta	178	Brannan-Andrus Island	Large	4	Medium	3	5	2	3	0
62	Delta	178	Brannan-Andrus Island	Large	5	Medium	3	5	2	3	0
62	Delta	178	Brannan-Andrus Island	Large	6	Medium	3	5	2	3	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
62	Delta	178	Brannan-Andrus Island	Large	7	Medium	3	4	2	3	0
62	Delta	178	Brannan-Andrus Island	Large	8	Medium	2	4	2	3	0
63	Delta	179	Twitchell_Island	Large	1	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	2	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	3	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	4	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	5	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	6	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	7	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	8	High	1	2	1	2	0
63	Delta	179	Twitchell_Island	Large	1	Medium	3	5	2	3	0
63	Delta	179	Twitchell_Island	Large	2	Medium	3	5	2	3	0
63	Delta	179	Twitchell_Island	Large	3	Medium	3	5	2	3	0
63	Delta	179	Twitchell_Island	Large	4	Medium	2	4	2	3	0
63	Delta	179	Twitchell_Island	Large	5	Medium	3	5	2	3	0
63	Delta	179	Twitchell_Island	Large	6	Medium	3	5	2	3	0
63	Delta	179	Twitchell_Island	Large	7	Medium	3	5	2	3	0
63	Delta	179	Twitchell_Island	Large	8	Medium	3	5	2	3	0
64	Delta	181	Sherman_Island	Large	1	High	1	2	1	2	0
64	Delta	181	Sherman_Island	Large	2	High	1	2	1	2	40
64	Delta	181	Sherman_Island	Large	3	High	1	2	1	2	0
64	Delta	181	Sherman_Island	Large	4	High	1	2	1	2	0
64	Delta	181	Sherman_Island	Large	5	High	1	2	1	2	0
64	Delta	181	Sherman_Island	Large	6	High	2	3	2	3	0
64	Delta	181	Sherman_Island	Large	7	High	1	2	1	2	0
64	Delta	181	Sherman_Island	Large	8	High	1	2	1	2	0
64	Delta	181	Sherman_Island	Large	1	Medium	3	5	2	3	0
64	Delta	181	Sherman_Island	Large	2	Medium	3	5	2	3	0
64	Delta	181	Sherman_Island	Large	3	Medium	3	4	2	3	0
64	Delta	181	Sherman_Island	Large	4	Medium	3	4	2	3	0
64	Delta	181	Sherman_Island	Large	5	Medium	3	5	2	3	0
64	Delta	181	Sherman_Island	Large	6	Medium	5	9	4	6	0
64	Delta	181	Sherman_Island	Large	7	Medium	3	5	2	3	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
64	Delta	181	Sherman_Island	Large	8	Medium	3	5	2	3	0
65	Delta	182	Shin_Kee_Tract	Large	1	High	1	2	1	2	0
65	Delta	182	Shin_Kee_Tract	Large	2	High	1	1	0	0	0
65	Delta	182	Shin_Kee_Tract	Large	3	High	0	0	0	0	0
65	Delta	182	Shin_Kee_Tract	Large	4	High	1	1	1	1	0
65	Delta	182	Shin_Kee_Tract	Large	5	High	1	1	1	1	0
65	Delta	182	Shin_Kee_Tract	Large	6	High	1	2	1	2	0
65	Delta	182	Shin_Kee_Tract	Large	7	High	1	1	1	1	0
65	Delta	182	Shin_Kee_Tract	Large	8	High	1	1	1	1	0
65	Delta	182	Shin_Kee_Tract	Large	1	Medium	2	4	2	3	0
65	Delta	182	Shin_Kee_Tract	Large	2	Medium	1	2	0	0	0
65	Delta	182	Shin_Kee_Tract	Large	3	Medium	0	0	0	0	0
65	Delta	182	Shin_Kee_Tract	Large	4	Medium	2	4	1	2	0
65	Delta	182	Shin_Kee_Tract	Large	5	Medium	2	4	2	2	0
65	Delta	182	Shin_Kee_Tract	Large	6	Medium	3	4	2	3	0
65	Delta	182	Shin_Kee_Tract	Large	7	Medium	2	3	1	2	0
65	Delta	182	Shin_Kee_Tract	Large	8	Medium	2	4	2	2	0
66	Delta	183	Rio_Blanco_Tract	Large	1	High	1	1	1	1	0
66	Delta	183	Rio_Blanco_Tract	Large	2	High	1	1	0	0	40
66	Delta	183	Rio_Blanco_Tract	Large	3	High	0	0	0	0	0
66	Delta	183	Rio_Blanco_Tract	Large	4	High	1	1	1	1	0
66	Delta	183	Rio_Blanco_Tract	Large	5	High	1	1	1	1	0
66	Delta	183	Rio_Blanco_Tract	Large	6	High	1	1	1	1	0
66	Delta	183	Rio_Blanco_Tract	Large	7	High	1	1	1	1	0
66	Delta	183	Rio_Blanco_Tract	Large	8	High	1	1	1	1	0
66	Delta	183	Rio_Blanco_Tract	Large	1	Medium	2	4	1	2	0
66	Delta	183	Rio_Blanco_Tract	Large	2	Medium	2	4	0	0	0
66	Delta	183	Rio_Blanco_Tract	Large	3	Medium	0	0	0	0	0
66	Delta	183	Rio_Blanco_Tract	Large	4	Medium	2	4	2	2	0
66	Delta	183	Rio_Blanco_Tract	Large	5	Medium	2	4	2	2	0
66	Delta	183	Rio_Blanco_Tract	Large	6	Medium	2	4	2	2	0
66	Delta	183	Rio_Blanco_Tract	Large	7	Medium	2	4	2	3	0
66	Delta	183	Rio_Blanco_Tract	Large	8	Medium	2	4	2	2	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
67	Delta	184	Bishop_Tract	Large	1	High	1	1	1	1	0
67	Delta	184	Bishop_Tract	Large	2	High	1	1	0	0	0
67	Delta	184	Bishop_Tract	Large	3	High	0	0	0	0	0
67	Delta	184	Bishop_Tract	Large	4	High	10	16	0	0	40
67	Delta	184	Bishop_Tract	Large	5	High	17	26	17	26	0
67	Delta	184	Bishop_Tract	Large	6	High	19	30	19	30	0
67	Delta	184	Bishop_Tract	Large	7	High	9	15	9	15	0
67	Delta	184	Bishop_Tract	Large	8	High	1	1	1	1	0
67	Delta	184	Bishop_Tract	Large	1	Medium	2	4	2	2	0
67	Delta	184	Bishop_Tract	Large	2	Medium	2	3	0	0	0
67	Delta	184	Bishop_Tract	Large	3	Medium	0	0	0	0	0
67	Delta	184	Bishop_Tract	Large	4	Medium	32	51	0	0	0
67	Delta	184	Bishop_Tract	Large	5	Medium	42	68	28	45	0
67	Delta	184	Bishop_Tract	Large	6	Medium	50	81	33	53	0
67	Delta	184	Bishop_Tract	Large	7	Medium	23	37	15	24	0
67	Delta	184	Bishop_Tract	Large	8	Medium	2	4	2	2	0
68	Delta	186	Zone 186	Small	1	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	2	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	3	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	4	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	5	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	6	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	7	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	8	High	0	0	0	0	0
68	Delta	186	Zone 186	Small	1	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	2	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	3	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	4	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	5	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	6	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	7	Medium	0	0	0	0	0
68	Delta	186	Zone 186	Small	8	Medium	0	0	0	0	0
69	Delta	187	Shima_Tract	Large	1	High	10	17	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
69	Delta	187	Shima_Tract	Large	2	High	201	346	0	0	0
69	Delta	187	Shima_Tract	Large	3	High	0	0	0	0	0
69	Delta	187	Shima_Tract	Large	4	High	387	567	0	0	0
69	Delta	187	Shima_Tract	Large	5	High	9	16	9	16	0
69	Delta	187	Shima_Tract	Large	6	High	8	15	8	15	0
69	Delta	187	Shima_Tract	Large	7	High	9	16	9	16	0
69	Delta	187	Shima_Tract	Large	8	High	9	16	9	16	0
69	Delta	187	Shima_Tract	Large	1	Medium	25	44	0	0	0
69	Delta	187	Shima_Tract	Large	2	Medium	380	609	0	0	0
69	Delta	187	Shima_Tract	Large	3	Medium	0	0	0	0	0
69	Delta	187	Shima_Tract	Large	4	Medium	747	1123	0	0	0
69	Delta	187	Shima_Tract	Large	5	Medium	26	45	17	29	0
69	Delta	187	Shima_Tract	Large	6	Medium	21	36	13	23	0
69	Delta	187	Shima_Tract	Large	7	Medium	24	42	16	28	0
69	Delta	187	Shima_Tract	Large	8	Medium	27	47	17	30	0
70	Delta	188	Lincoln_Village_Tract	Large	1	High	141	171	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	2	High	175	181	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	3	High	0	0	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	4	High	174	316	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	5	High	91	270	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	6	High	109	175	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	7	High	143	249	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	8	High	181	314	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	1	Medium	729	793	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	2	Medium	395	408	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	3	Medium	0	0	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	4	Medium	523	900	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	5	Medium	309	653	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	6	Medium	241	386	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	7	Medium	376	646	0	0	0
70	Delta	188	Lincoln_Village_Tract	Large	8	Medium	649	908	0	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	1	High	67	10	67	10	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	2	High	0	0	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
71	Delta	189	Sargent_Barnhart_Tract 3	Small	3	High	0	0	0	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	4	High	77	0	77	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	5	High	88	0	88	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	6	High	63	0	63	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	7	High	86	0	86	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	8	High	93	0	93	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	1	Medium	46	0	46	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	2	Medium	0	0	0	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	3	Medium	22	0	0	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	4	Medium	35	0	35	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	5	Medium	25	0	25	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	6	Medium	49	0	49	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	7	Medium	26	0	26	0	0
71	Delta	189	Sargent_Barnhart_Tract 3	Small	8	Medium	19	0	19	0	0
72	Delta	190	Wright-Elmwood_Tract	Large	1	High	1	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	2	High	6	9	6	9	0
72	Delta	190	Wright-Elmwood_Tract	Large	3	High	2	2	2	2	0
72	Delta	190	Wright-Elmwood_Tract	Large	4	High	1	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	5	High	1	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	6	High	1	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	7	High	1	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	8	High	1	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	1	Medium	2	1	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	2	Medium	4	5	3	4	0
72	Delta	190	Wright-Elmwood_Tract	Large	3	Medium	2	2	2	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	4	Medium	2	2	2	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	5	Medium	2	2	1	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	6	Medium	3	2	2	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	7	Medium	2	2	2	1	0
72	Delta	190	Wright-Elmwood_Tract	Large	8	Medium	2	2	2	1	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	1	High	171	185	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	2	High	0	0	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	3	High	267	280	0	0	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
73	Delta	191	Sargent_Barnhart_Tract 2	Large	4	High	116	137	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	5	High	104	123	104	123	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	6	High	94	111	94	111	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	7	High	170	163	170	163	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	8	High	192	183	192	183	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	1	Medium	551	642	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	2	Medium	0	0	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	3	Medium	766	621	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	4	Medium	389	493	0	0	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	5	Medium	277	326	179	211	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	6	Medium	230	266	153	177	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	7	Medium	448	428	295	282	0
73	Delta	191	Sargent_Barnhart_Tract 2	Large	8	Medium	506	484	344	329	0
74	Delta	210	Ryer Island	Large	1	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	2	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	3	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	4	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	5	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	6	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	7	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	8	High	1	1	1	1	0
74	Delta	210	Ryer Island	Large	1	Medium	2	2	1	1	0
74	Delta	210	Ryer Island	Large	2	Medium	1	1	1	1	0
74	Delta	210	Ryer Island	Large	3	Medium	2	2	1	1	0
74	Delta	210	Ryer Island	Large	4	Medium	2	2	1	1	0
74	Delta	210	Ryer Island	Large	5	Medium	2	2	1	1	0
74	Delta	210	Ryer Island	Large	6	Medium	1	1	1	1	0
74	Delta	210	Ryer Island	Large	7	Medium	2	2	1	1	0
74	Delta	210	Ryer Island	Large	8	Medium	2	2	1	1	0
75	Delta	211	Prospect_Island	Large	1	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	2	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	3	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	4	High	0	0	0	0	0

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
75	Delta	211	Prospect_Island	Large	5	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	6	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	7	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	8	High	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	1	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	2	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	3	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	4	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	5	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	6	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	7	Medium	0	0	0	0	0
75	Delta	211	Prospect_Island	Large	8	Medium	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	1	High	2	2	2	2	0
76	Delta	212	Clifton Court Forebay Water	Large	2	High	2	2	2	2	0
76	Delta	212	Clifton Court Forebay Water	Large	3	High	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	4	High	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	5	High	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	6	High	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	7	High	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	8	High	2	2	2	2	0
76	Delta	212	Clifton Court Forebay Water	Large	1	Medium	7	6	4	4	0
76	Delta	212	Clifton Court Forebay Water	Large	2	Medium	5	5	4	3	0
76	Delta	212	Clifton Court Forebay Water	Large	3	Medium	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	4	Medium	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	5	Medium	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	6	Medium	0	0	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	7	Medium	1	1	0	0	0
76	Delta	212	Clifton Court Forebay Water	Large	8	Medium	5	5	4	3	0
77	Delta	216	Zone 216	Small	1	High	2	2	2	2	0
77	Delta	216	Zone 216	Small	2	High	3	3	0	0	0
77	Delta	216	Zone 216	Small	3	High	2	2	2	2	0
77	Delta	216	Zone 216	Small	4	High	2	2	0	0	0
77	Delta	216	Zone 216	Small	5	High	0	0	0	0	0

Appendix 12B
Demographics Data Used in Fatality Risk Analysis

Order	Region	Analysis Zone Number	Analysis Zone	Island Size	Breach Sector	Flood Severity Zone	Flood Daytime Population	Flood Nighttime Population	Seismic or Normal Daytime Population	Seismic or Normal Nighttime Population	Highway User
77	Delta	216	Zone 216	Small	6	High	0	0	0	0	0
77	Delta	216	Zone 216	Small	7	High	0	0	0	0	0
77	Delta	216	Zone 216	Small	8	High	3	3	0	0	0
77	Delta	216	Zone 216	Small	1	Medium	8	8	8	8	0
77	Delta	216	Zone 216	Small	2	Medium	7	7	0	0	0
77	Delta	216	Zone 216	Small	3	Medium	8	8	8	8	0
77	Delta	216	Zone 216	Small	4	Medium	8	8	0	0	0
77	Delta	216	Zone 216	Small	5	Medium	0	0	0	0	0
77	Delta	216	Zone 216	Small	6	Medium	0	0	0	0	0
77	Delta	216	Zone 216	Small	7	Medium	8	8	0	0	0
77	Delta	216	Zone 216	Small	8	Medium	8	8	0	0	0
78	Delta	412	Clifton Court Forebay	Large	1	High	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	2	High	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	3	High	2	2	2	2	0
78	Delta	412	Clifton Court Forebay	Large	4	High	1	1	1	1	0
78	Delta	412	Clifton Court Forebay	Large	5	High	2	2	2	2	0
78	Delta	412	Clifton Court Forebay	Large	6	High	1	1	0	0	0
78	Delta	412	Clifton Court Forebay	Large	7	High	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	8	High	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	1	Medium	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	2	Medium	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	3	Medium	5	5	4	3	0
78	Delta	412	Clifton Court Forebay	Large	4	Medium	6	5	4	4	0
78	Delta	412	Clifton Court Forebay	Large	5	Medium	6	5	4	3	0
78	Delta	412	Clifton Court Forebay	Large	6	Medium	4	3	0	0	0
78	Delta	412	Clifton Court Forebay	Large	7	Medium	0	0	0	0	0
78	Delta	412	Clifton Court Forebay	Large	8	Medium	0	0	0	0	0

Appendix 12C

Fatality Risks by Island and Breach Sector

Appendix 12C
Fatality Risks by Island and Breach Sector

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	Probability of Number of Fatalities Equal to or Greater than Given Number										
									0	1	2	5	10	20	50	100	200	500	1000
1	Delta	4	Webb_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Daytime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
7	Delta	11	Quimby_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
14	Delta	19	Woodward_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 12C
Fatality Risks by Island and Breach Sector

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
21	Delta	70	Egbert_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
27	Delta	88	Cache_Haas_Tract 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	3	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
41	Delta	146	Sutter Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	1	12.025	1.443	0.00E+00	1.00E+00	1.00E+00	1.00E+00	9.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	4	10.175	1.221	0.00E+00	1.00E+00	1.00E+00	1.00E+00	7.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	5	15.725	1.887	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	6	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	7	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Daytime	8	11.1	1.332	0.00E+00	1.00E+00	1.00E+00	1.00E+00	8.85E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	1	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	4	10.175	1.221	0.00E+00	1.00E+00	1.00E+00	1.00E+00	7.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	5	7.4	0.888	3.89E-15	1.00E+00	1.00E+00	9.99E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	6	12.025	1.443	0.00E+00	1.00E+00	1.00E+00	1.00E+00	9.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	7	3.7	0.444	2.86E-13	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Daytime	8	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
54	Delta	169	McCormack_Williamson_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
61	Delta	177	Bouldin_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	2	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	2	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	4	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
68	Delta	186	Zone 186	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	2	10.175	1.221	0.00E+00	1.00E+00	1.00E+00	1.00E+00	7.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	4	19.425	2.331	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	4.87E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	1	7.4	0.888	3.89E-15	1.00E+00	1.00E+00	9.99E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	2	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	4	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	5	4.625	0.555	5.33E-14	1.00E+00	1.00E+00	5.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	6	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	7	7.4	0.888	3.89E-15	1.00E+00	1.00E+00	9.99E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Daytime	8	9.25	1.11	0.00E+00	1.00E+00	1.00E+00	1.00E+00	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	1	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	4	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	5	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	6	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	7	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Daytime	8	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	1	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	3	12.95	1.554	0.00E+00	1.00E+00	1.00E+00	1.00E+00	9.87E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	4	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	5	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	6	4.625	0.555	5.33E-14	1.00E+00	1.00E+00	5.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	7	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Daytime	8	9.25	1.11	0.00E+00	1.00E+00	1.00E+00	1.00E+00	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
75	Delta	211	Prospect_Island	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Daytime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	Delta	4	Webb_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	Delta	5	Empire_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	Delta	6	Bradford_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
3	Delta	6	Bradford_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	Delta	7	King_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	Delta	9	Jersey_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	1	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	2	11.1	1.332	0.00E+00	1.00E+00	1.00E+00	1.00E+00	8.85E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	3	9.25	1.11	0.00E+00	1.00E+00	1.00E+00	1.00E+00	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	4	6.475	0.777	7.33E-15	1.00E+00	1.00E+00	9.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	5	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	6	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	7	6.475	0.777	7.33E-15	1.00E+00	1.00E+00	9.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	Delta	10	Bethel_Island	Flood	Nighttime	8	6.475	0.777	7.33E-15	1.00E+00	1.00E+00	9.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	Delta	11	Quimby_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Delta	12	McDonald_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Delta	13	Holland_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
10	Delta	14	Zone 14	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	Delta	14	Zone 14	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	Delta	15	Bacon_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	Delta	16	Palm_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	Delta	17	Jones_Tract-Upper_and_Lower	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	Delta	19	Woodward_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	Delta	20	Orwood_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16	Delta	21	Victoria_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 12C
Fatality Risks by Island and Breach Sector

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
17	Delta	32	Coney_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	Delta	32	Coney_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	1	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	2	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	3	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	4	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	5	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	6	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	7	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
18	Delta	62	Walnut_Grove	Flood	Nighttime	8	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	Delta	63	Tyler_Island 2	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	Delta	68	Little_Egbert_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	Delta	70	Egbert_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	Delta	72	Peter Pocket	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23	Delta	81	Zone 81	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 12C
Fatality Risks by Island and Breach Sector

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24	Delta	83	Hastings_Tract 2	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	Delta	86	Terminous_Tract 1	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
26	Delta	87	Terminous_Tract 2	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	Delta	88	Cache_Haas_Tract 1	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	Delta	89	Cache_Haas_Tract 2	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29	Delta	106	Lower_Roberts_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
30	Delta	108	Hotchkiss_Tract 1	Flood	Nighttime	8	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	Delta	109	Hotchkiss_Tract 2	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	Delta	115	Upper_Roberts_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
33	Delta	117	Union_Island 1	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	1	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	2	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	3	3.7	0.444	2.86E-13	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
34	Delta	126	Pico_Naglee_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	4	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	5	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
35	Delta	127	Byron_Tract 1	Flood	Nighttime	8	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
36	Delta	129	Veale_Tract 1	Flood	Nighttime	8	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
37	Delta	141	Merritt Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	Delta	141	Merritt Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	Delta	142	Netherlands 2	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	Delta	143	Rindge_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
40	Delta	144	Mandeville_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	Delta	146	Sutter Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	Delta	147	Grand Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	Delta	148	Zone 148	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
44	Delta	149	Pierson_Tract	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	Delta	149	Pierson_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	Delta	150	Venice_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	Delta	152	Medford_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	Delta	153	Rough_and_Ready_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	Delta	154	Middle_Roberts_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	1	113.775	13.653	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	8.52E-01	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	4	135.975	16.317	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.87E-01	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	5	148	17.76	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.97E-01	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	6	24.05	2.886	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	7	29.6	3.552	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.98E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	Delta	157	Smith_Tract	Flood	Nighttime	8	93.425	11.211	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	2.94E-01	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	1	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	4	90.65	10.878	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	5	72.15	8.658	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.96E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	6	86.025	10.323	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	7	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	Delta	159	Boggs_Tract	Flood	Nighttime	8	8.325	0.999	2.33E-15	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
51	Delta	162	Zone 162	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	Delta	162	Zone 162	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	Delta	163	Fabian_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	1	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	2	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	3	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	4	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	5	3.7	0.444	2.86E-13	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	6	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	7	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	Delta	168	Libby_McNeil_Tract 1	Flood	Nighttime	8	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	Delta	169	McCormack_Williamson_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	Delta	170	Glanville_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	2	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	Delta	172	New_Hope_Tract	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	Delta	173	Deadhorse Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 12C
Fatality Risks by Island and Breach Sector

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
57	Delta	173	Deadhorse Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	Delta	174	Staten_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	Delta	175	Canal Ranch	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	Delta	176	Brack_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	Delta	177	Bouldin_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	Delta	178	Brannan-Andrus Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	Delta	179	Twitchell_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	2	14.8	1.776	0.00E+00	1.00E+00	1.00E+00	1.00E+00	9.99E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	4	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
64	Delta	181	Sherman_Island	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	7	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	Delta	181	Sherman_Island	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	6	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	Delta	182	Shin_Kee_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	2	13.875	1.665	0.00E+00	1.00E+00	1.00E+00	1.00E+00	9.96E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	Delta	183	Rio_Blanco_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	4	19.425	2.331	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	4.87E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	5	9.25	1.11	0.00E+00	1.00E+00	1.00E+00	1.00E+00	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	6	10.175	1.221	0.00E+00	1.00E+00	1.00E+00	1.00E+00	7.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	7	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	Delta	184	Bishop_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	Delta	186	Zone 186	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	1	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	2	119.325	14.319	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.17E-01	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	4	195.175	23.421	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	4.27E-01	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	5	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	6	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	7	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
69	Delta	187	Shima_Tract	Flood	Nighttime	8	5.55	0.666	1.70E-14	1.00E+00	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	1	59.2	7.104	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.14E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	2	61.975	7.437	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.53E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	4	109.15	13.098	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	7.69E-01	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	5	93.425	11.211	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	2.94E-01	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	6	60.125	7.215	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.30E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	7	86.025	10.323	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	Delta	188	Lincoln_Village_Tract	Flood	Nighttime	8	108.225	12.987	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	7.49E-01	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	1	1.85	0.222	5.97E-10	1.00E+00	9.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	Delta	189	Sargent_Barnhart_Tract 3	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	2	2.775	0.333	4.19E-12	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	Delta	190	Wright-Elmwood_Tract	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	1	63.825	7.659	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	3	96.2	11.544	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	3.87E-01	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	4	47.175	5.661	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	3.41E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	5	42.55	5.106	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	6	37.925	4.551	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	7	56.425	6.771	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	8.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	Delta	191	Sargent_Barnhart_Tract 2	Flood	Nighttime	8	62.9	7.548	0.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	9.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	Delta	210	Ryer Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	Delta	211	Prospect_Island	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	1	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	Delta	212	Clifton Court Forebay Water	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	2	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	3	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	5	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Delta	216	Zone 216	Flood	Nighttime	8	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	1	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 12C
Fatality Risks by Island and Breach Sector

Order	Region	Analysis Zone Number	Analysis Zone	Initiating Event	Exposure Time	Breach Sector	Breach Mean (Life Loss)	Breach Std Dev (Life Loss)	0	1	2	5	10	20	50	100	200	500	1000
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	2	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	3	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	4	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	5	0.925	0.111	6.44E-05	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	6	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	7	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	Delta	412	Clifton Court Forebay	Flood	Nighttime	8	0	0	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 12D

Example Calculation of Probabilities of Exceeding Different Numbers of Fatalities for a Given Levee Failure Sequence

Island #1: Bethel Island; breaches at N, E, and SW sectors

Island #2: Bradford Island; breaches at S and W sectors

Initiating Event: Seismic

Exposure Time: Nighttime

For Bethel Island - N sector, GIS search for population within the high and medium severity zones shows 16 and 36 people, respectively. The warning issuance time is 0.5 hour. The times to reach the boundary of high and medium severity zones are 0.27 and 0.43 hour, respectively. Therefore, 100% of the population in each zone is at risk. For the high severity zone, the mean and standard deviation of fraction life loss are 0.925 and 0.111, respectively. For the medium severity zone, the mean and standard deviation of fraction life loss are 0.121 and 0.178, respectively.

Mean number of fatalities in the high severity zone

$$= 0.925 \times 16$$

$$= 14.8 \qquad \text{… Equation (1)}$$

Variance of number of fatalities in the high severity zone

$$= 0.111^2 \times 16^2$$

$$= 3.2 \qquad \text{… Equation (2)}$$

Mean number of fatalities in the medium severity zone

$$= 0.121 \times 36$$

$$= 4.4 \qquad \text{… Equation (1)}$$

Variance of number of fatalities in the medium severity zone

$$= 0.178^2 \times 36^2$$

$$= 41.1 \qquad \text{… Equation (2)}$$

Therefore,

Mean number of fatalities for both severity zones

$= 14.8 + 4.4$

$= 19.2$ … Equation (4)

Variance of number of fatalities for both severity zones

$= 3.2 + 41.1 + 2 \times \sqrt{3.2} \times \sqrt{41.1}$

$= 67.0$ … Equation (5)

Similar calculations are performed for other islands/sectors and the results are shown as follows:

Island	Sector	Mean Number of Fatalities	Variance of Number of Fatalities	Standard Deviation of Number of Fatalities
Bethel Island	N	19.2	67.0	8.2
Bethel Island	E	31.5	159.0	12.6
Bethel Island	SW	16.8	35.2	5.9
Bradford Island	S	1.17	0.22	0.47
Bradford Island	W	1.29	0.42	0.65

<u>Bethel Island:</u>

Mean number of fatalities for all breaches

$= 19.2 + 31.5 + 16.8$

$= 67.5$ … Equation (8)

Variance of number of fatalities for all breaches

$= 8.2^2 + 12.6^2 + 5.9^2 + 2 \times (8.2\times12.6 + 8.2\times5.9 + 12.6\times5.9)$

$= 712.9$ … Equation (9)

<u>Bradford Island:</u>

Mean number of fatalities for all breaches

$= 1.17 + 1.29$

$= 2.46$ … Equation (8)

Variance of number of fatalities for all breaches

$= 0.47^2 + 0.65^2 + 2 \times (0.47\times0.65)$

$= 1.25$ … Equation (9)

<u>Combined fatality risk over both islands:</u>

Mean number of fatalities for both islands

$= 67.5 + 2.46$

$= 69.96$ … Equation (11)

Variance of number of fatalities for both islands

$= 712.9 + 1.25$

$= 714.15$ … Equation (12)

Assuming normal distribution (using Equation (6)):

Probability of greater than or equal to 10 fatalities,

$$P[n \geq 10] = 1 - \Phi\left[\frac{10 - 69.96}{\sqrt{714.15}}\right] = 0.99$$

Probability of greater than or equal to 100 fatalities,

$$P[n \geq 100] = 1 - \Phi\left[\frac{100 - 69.96}{\sqrt{714.15}}\right] = 0.13$$

Appendix 12E

Total Organic Carbon Impacts

Table of Contents

WAM Acronyms and Abbreviations

BAU	Business as Usual
CalSim	California Water System Simulation Model (DWR & USBR)
cfs	cubic feet per second
CO_2	Carbon Dioxide
CVP	Federal Central Valley Project
DRMS	Delta Risk Management Strategy
DWR	California Department of Water Resources
dss	Data storage system
EC	Electrical Conductivity
HD	The WAM Hydrodynamic / Water Quality Submodel
ITF	Initial Technical Framework
JBA	Jack R. Benjamin & Associates
mg/L	milligrams per liter
MWH	Megawatt Hours
NDAL	Net Delta Area Losses (or Net Delta Consumptive Water Use)
RMA	Resource Management Associates, the DRMS hydrodynamics consultant
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	Thousand Acre-Feet
TM	Technical Memorandum
TOC	Total organic carbon
µmhos/cm	micro mhos per centimeter – Electrical Conductivity, a measure of salinity
URS	URS Corporation
USBR	United States Bureau of Reclamation
WAM	Water Analysis Module or Model
WY	Water Year

Executive Summary

A preliminary analysis of total organic carbon (TOC) increases was conducted for six specific Delta levee breach scenarios. These scenarios also include variations in water year type and seasonality. The mass of TOC produced from the flooded peat islands as well as the increases in TOC concentrations at Clifton Court Forebay were modeled for the period when salinity was restored enough to allow water exports to resume. Particle tracking hydrodynamic modeling was not used in the analysis.

Two critical drinking water quality thresholds were determined for TOC: the point at which additional treatment costs would be incurred, and the point at which current operations for organic carbon treatment (enhanced coagulation) was no longer effective.

The island inundation scenarios evaluated range from one breach on one island to forty-six breaches among thirty islands. The schedule to reclaim the islands ranges from 1.6 to 6.6 years. Enhanced coagulation is needed for 100 to 560 days with an estimated cost that ranged from $12 to $68 million. Water exports are interrupted due to salinity intrusion for 1 to 23 months. Additional decisions regarding water exports and interruptions due to TOC range from 0 to 30 months.

Drinking water can be reliably treated with enhanced coagulation in the 1 and 3 flooded islands scenarios evaluated, and in one of the 10 flooded islands scenarios. More substantial problems occur in the 20 and 30 flooded island scenarios. With sustained TOC concentrations greater than 6 milligrams per liter (mg/L), the Delta water may not be usable for municipal and industrial purposes however it may be suitable for agriculture. Decisions must then be made regarding water exports that impact potability in downstream reservoirs, storage, and drinking water treatment facilities.

More detailed modeling and an evaluation of dewatering locations and rates can be used to refine the predicted magnitude and duration of spikes. However additional treatment options would be needed to address periods when TOC concentrations are above 6 mg/L.

E.1 Introduction

Water exported from the Sacramento-San Joaquin river delta (Delta) is an important drinking water source for more then 20 million people in California. Dissolved organic carbon (DOC) is a disinfection byproduct precursor for chlorinated drinking water. It is estimated that 20 to 50 percent of Delta water trihalomethane precursors originate from drainage water from Delta islands peat soil (Fujii et al. 1998).

The high organic matter content of peat is associated with high DOC concentrations in the soil pore water. DOC production within peat soil and sediment is a result of microbial activities that break down complex organic compounds in decaying plant matter to simpler compounds. These low molecular weight compounds then undergo a series of condensation reactions to recombine into higher molecular weight compounds such as fulvic acids and humic substances which make up DOC (Thibodeaux and Aguilar 2005). When inundated, the DOC will move from the bed layer into the overlaying water.

The organic matter fraction of peat soils in the central Delta is particularly high. Jersey Island, Orwood Tract, Sherman Island, and Twitchell Island have soil organic matter fractions that range from 18 to 37 percent (Aguilar and Thibodeaux 2005). Muck, which primarily consists of decomposed peat, is the predominant soil type in the central Delta (Delta Protection Commission 2005).

Delta water exporters are concerned about the potential impact of organic carbon on drinking water intakes due to flooded peat islands.

E.2 Purpose

The purpose of this memorandum is to address the concerns raised by drinking water exporters regarding total organic carbon increases and the resulting water quality treatment cost increases that would occur from Delta island flooding in the event of multiple island/multiple levee breaches.

E.3 Approach

The Department of Water Resources (DWR) conducted measurements and modeling of organic carbon releases as part of the 2004 Jones Tract levee failure and response. We have adapted the organic carbon model created by the DWR to predict the mass of organic carbon produced and released for the six levee failure cases described in the Phase 1 DRMS report. This includes both a quick release fraction and sustained production due to microbial mediated production.

The Jones Tract report also presents a fingerprint for DOC at Clifton Court Forebay during dewatering at Upper and Lower Jones Tract. This fingerprint was based on output from the DWR Delta Simulation Model (DSM2). The mass of DOC in the fingerprint that is attributed to Jones Tract was calculated and compared to the mass of DOC released during dewatering. This comparison was used to create a global scaling factor that accounts for the difference between the amount of organic carbon produced and the amount of organic carbon that reaches Clifton Court Forebay. Scaling factors were then assigned to each of the islands based upon this factor as well as island location/net flow direction during exports.

The water treatments costs associated with organic carbon removal, as provided by Delta exporters, was then used to develop an order of magnitude cost estimate for the increase in water treatment costs due to the increases in organic carbon at the southern Delta drinking water intakes for each of the six cases.

E.4 Organic Carbon Models

E.4.1 Island Production

Several factors can influence the release of organic carbon from island peat soil due to island inundation. The quick release fraction of DOC comes from a finite amount of readily available material. This fraction becomes suspended on the time scale of hours to days. When a Delta levee is breached, the water that fills the island is turbulent and has high velocity flows. Particle suspension occurs during filling. Shear forces may release colloids that were previously attached to soil surfaces. The inundation also gives rise to flows within the pore spaces of the soil. This may cause colloids to become detached from soil particles within the bed and will also cause unassociated organic carbon material to enter the overlaying water.

Another portion of the DOC is generated by microbial processes in the peat sediment and is produced nearly continuously and is subsequently released from the bed. This long-term fraction can be generated on the time scale of years to decades. The release rate is dependent on the organic fraction in the soil and on temperature/seasonal variations. As time increases the percent organic carbon in the bed soil slowly decreases, as does the release rate (Aguilar and Thibodeaux 2005). The DOC is transported from sediment pore water to the overlying water through molecular diffusion or advection.

The conversion between DOC and TOC is necessary for calculations. Operationally DOC is defined as non-settleable organic matter in the <0.45 μm size range (Aguilar and Thibodeaux 2005). TOC includes both particulate organic carbon and DOC. In the flooded peat soils at Jones Tract, DOC comprised an average of 85 percent of the TOC (DuVall et al. 2005); this conversion factor was assumed for all Delta islands.

Quick Release

DuVall et al. (2005) estimated the initial release DOC concentration at Jones Tract by multivariate regression analysis. Upper Jones had a quick release concentration (as determined by wet oxidation analysis) of 2.22 mg/L, and Lower Jones had a quick release concentration of 5.78 mg/L. Assuming that Jones Tract had an average depth of 3.7 meters, the initial release is 8.2 g/m^2 of DOC for Upper Jones and 21.4 g/m^2 of DOC for Lower Jones.

Thibodeaux and Aguilar (2005) developed a model that predicts both the quick release fraction and the bacterial mediated long-term release fraction for DOC. For a hypothetical enclosed reservoir, with a depth of 3 meters, a peat bed consisting of 15% organic carbon, and inundation flows which disturb 10 cm of soil and release the associated pore water DOC content, the initial average DOC concentration in the reservoir is 3.53 mg/L with a reported range of uncertainty between 2.65 and 4.39 mg/L. This is equivalent to an initial release of 10.6 g/m^2 of DOC, with a range of 8 to 13.2 g/m^2 of DOC.

It is interesting to note some of the experimental differences behind these quick release estimates. The Jones Tract estimates represent actual field data from a dynamic system. Upper Jones was an open system that was in contact with fresher river water through the unrepaired levee for three weeks. During this time there was potential DOC loss into the channels and dilution by the channel water at the sampling location. Lower Jones was connected to Upper Jones via a passage under a railroad trestle, opposite to and nearly five miles away from the levee breach. Any DOC loss or dilution was by water from Upper Jones and not directly by channel water. The quick release estimate for Lower Jones would be less confounded by freshwater dilution and DOC lost from the system.

The Thibodeaux and Aguilar model was calibrated by laboratory scale experimentation. They simulated the organic carbon flux from bed sediment pore water for three peat soils with different percent organic matter. As part of the experimental design, soil samples were homogenized and sieved prior to subsampling, and water was placed on sediment so as to avoid particle suspension in the jar reactors. The sample preparation for the experiment potentially contributed to an increase in the amount of readily available organic carbon in the pore water; the experimental design potentially decreased the amount of organic carbon flux due to colloid detachment from suspended sediments. The Thibodeaux and Aguilar model quick release estimate does not fully account for field conditions which occur during Delta island inundation.

The quick release estimate for Lower Jones derived from the multivariate regression analysis was chosen to determine the quick release fraction for the six levee failure cases. Section 4.3 contains the quick release organic carbon production (by mass in kg) for each of the islands in each three DRMS scenarios.

Bacterial Mediated Long-term Production

DuVall et al. (2005) developed a monthly average organic carbon flux rate in their seasonal flux model. This rate varies between 0 and 0.5 g/m^2-d of TOC depending on time of year. A monthly flux rate from this model and a monthly time step was used to determine the organic carbon areal flux for each of the islands in the DRMS scenarios. The monthly flux rates used in the calculations for the DRMS scenarios are as follows.

Table 1 Seasonal Flux Rates (Year One), DWR Seasonal Flux Model

Month	Flux rate for TOC (g/m^2-d)	Month	Flux rate for TOC (g/m^2-d)
January	0	July	0.5
February	0.04	August	0.47
March	0.13	September	0.38
April	0.25	October	0.25
May	0.38	November	0.13
June	0.47	December	0.04

Experimental data and other model values have similar flux rates as the seasonal flux model. The time dependent portion of the by multivariate regression analysis for DOC at Jones Tract is 0.118 mg/L-d (DuVall et al. 2005), which is calculated from field scale data acquired from Jones Tract. Assuming that Jones Tract had an average depth of 3.7 meters, the equivalent long-term release flux rate is 0.44 g/m^2-d of DOC or 0.51 g/m^2-d of TOC, when DOC is assumed to account for 85% of the TOC. A multi-year mesocosm experiment, performed by the DWR, had tanks with flooded peat soil that yielded a TOC flux rate of 0.41 to 0.45 g/m^2-d in warmer months and 0.12 to 0.15 g/m^2-d in cooler months (DuVall et al. 2005). The model developed and presented by Thibodeaux and Aguilar (2005) predicts the microbial produced DOC concentration from a hypothetical reservoir, which has a depth of 3 meters and a peat bed consisting of 15% organic carbon, to be 0.241 mg/L-d. This is equivalent to an areal flux rate of 0.72 g/m^2-d of DOC or 0.85 g/m^2-d of TOC.

The carbon flux model developed by the DWR in DuVall et al. 2005 was chosen for the long-term release of organic carbon. This model is consistent with field scale measurements and accounts for season variation, but does not account for variation in peat bed percent organic carbon.

E.4.2 Scaling Factors

Scaling factors were applied to each of the Delta islands to account for the difference between the amount of organic carbon that was produced on each island and the amount of organic carbon from that island that is expected to reach south Delta drinking water intakes. These scaling factors are based upon the assumed net flow direction during exports and a global scaling factor that accounts for additional loss.

Island Location / Distance from Southern Delta Pumps

Yield factors were applied to each island based on net flow direction during water exports and the distance from southern Delta drinking water intakes. Each island is assigned a zero percent, fifty percent, or one hundred percent yield factor. Figure 1 shows the location of central Delta islands and the assigned yield factors.

It is assumed that all of the organic carbon that is produced on Sherman Island would be swept into the bay and away from the southern Delta drinking water intakes by the Sacramento River. Jersey Island, Bradford Island, Twitchell Island, Brannon-Andrus Island, and Grand Island were assigned a 50 percent scaling factor to account for the influence of both water exports and the Sacramento River on net flow direction. Bethel Island, Webb Tract, Staten Island, Bouldin Island, Venice Island, Empire Tract, Medford Island, Mandeville Island, Quimby Island, Holland Island, Hotchkiss Tract, Veale Tract, Palm Tract, Bacon Island, McDonald Tract, Rindge Tract, Upper and Lower Jones Tract, Woodward Island, Orwood Tract, Victoria Island, Byron Tract, Middle Roberts Island, Union Island, and Fabian Tract are assumed to be close enough to Clifton Court Forebay to have pumping activities dominate the net flow direction of the surrounding channels.

0%

Sherman

50%

Brannon-Andrus Island
Twitchell Island
Bradford Island
Jersey Island

100%

Webb Tract
Bethel Island
Holland Tract
Quimby Island
Mandeville Island
McDonald Tract
Venice Island
Bouldin Island
Bacon Island
Palm Tract
Upper and Lower Jones Tract
Orwood Tract
Woodward Island
Byron Tract
Victoria Island

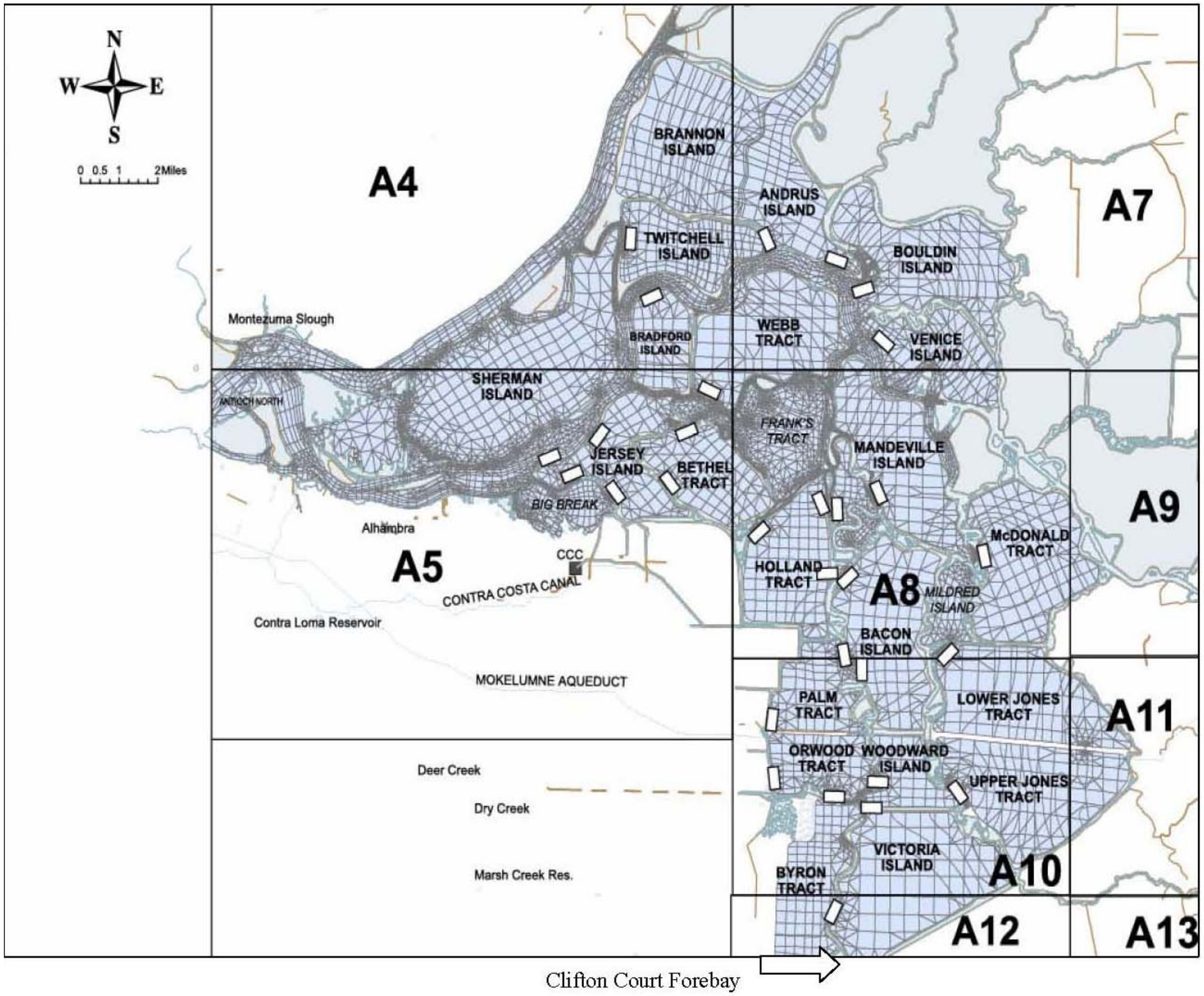


Figure 1 Yield factors for Central Delta islands due to net flow direction during exports/distance from Clifton Court Forebay.

Island Production vs. Intake Water

A global scaling factor of 50 percent was applied at each island regardless of location to account for the difference between the amount of organic carbon produced at Jones Tract and the amount of Jones Tract organic carbon found at the Banks Pumping Plant drinking water intakes.

DuVall et al. (2005) presents the DSM2 modeled fingerprint for DOC at Clifton Court Forebay, developed by the Bay Delta Office, during dewatering at Jones Tract. In this model, the sources that contribute DOC include the Sacramento River, the San Joaquin River, the east side tributaries, the Delta, and Jones Tract. Jones Tract contributed approximately 1.5 mg/L of DOC to Clifton Court Forebay in the last two months of the island pump-out. During this time the water intake volume ranged from 2,968 to 14,237 acre-feet per day (USBR 2005).

The DSM2 fingerprint indicates approximately a week delay between completion of the island pumping at Lower Jones Tract and the last of the Jones tract DOC to arrive at Clifton Court Forebay. This indicates a travel time on the order of days to weeks for organic carbon from Jones Tract pump-out water to travel to Clifton Court Forebay.

From 10/25/04 to 12/20/04, Jones Tract contributed approximately 1.7 million kilograms of organic carbon to its adjacent channel through water pump-out in the final stage of repairs. This estimate is based upon information provided in DuVall et al. (2005), which includes the DOC linear regression equations, the average Jones Tract island depth that was used in DSM2 model, and the area of Upper and Lower Jones.

Approximately 0.9 million kilograms of organic carbon originating from Jones Tract arrived at the drinking water intakes at Clifton Court Forebay from 10/31/04 to 12/26/04. This estimate was calculated using information contained in the DSM2 fingerprint and from published intake volumes at Clifton Court Forebay.

The 50 percent scaling factor accounts for the difference between these calculations. The loss could be due to uptake, settling and burial, other water exports, tidal outflow to the Bay, and unknown processes.

E.4.3 Assumptions

The assumptions used in the models, the scaling factors, and in the calculations that predict the amount of TOC that potentially impacts drinking water treatments costs are discussed below.

Information from the Jones Tract levee failure and response was generalized to create the organic carbon quick release and long term flux calculations. There is an implicit assumption that the general flooded island scenario will have conditions similar to Jones Tract. In the flooded peat soils at Jones Tract, DOC contributed an average of 85 percent of the TOC; this conversion factor was assumed for all Delta islands. The quick release production seen at Upper Jones (21.4 g/m^2 of DOC) was the assumed areal production for all islands; this is potentially a lower end estimate because it does not account for possible dilution at Upper Jones. The long term TOC flux rates from the DWR seasonal flux model was the assumed production rate for all islands. These flux rates were calibrated with Jones Tract data but not experimentally derived.

Organic carbon production and transport can vary by island. The organic carbon flux rate would be influenced by the percent organic matter content in peat soil, which varies among islands and decays over time. Management decisions such as above Delta releases, i.e. reservoir releases north of the Delta, would influence the transport of organic carbon to southern Delta intakes. Additional factors that may be important include hydraulic exchange, organic carbon content of the channel water, and dispersion of organic carbon prior to levee repair.

Hydrodynamic modeling was not used for the transport of organic carbon from the islands to the Banks pumping plant. Instead, scaling factors were used based on general categorizations, which might not reflect actual flow dynamics.

The contribution of island TOC mass to southern Delta intakes was calculated after exports had resumed. These calculations account for the amount of mass predicted in the pump-out water and dewatering schedule and duration. Half of the island produced TOC was assumed to be transported from the island into the adjacent channels through open levees. This was modeled to occur until the breach repair was complete. For islands that had unrepaired levees during water exports, the TOC released from the open island contributed to the TOC loading at Clifton Court Forebay. The amount of TOC in the pump-out water was assumed to equal half of the initial “quick release” and long term TOC flux produced by that island prior to the completion of levee repair and all of the long term production thereafter.

The increase in TOC concentration at the southern Delta intakes due to flooded islands and dewatering repairs was also calculated. To model these increases the organic carbon contribution from Jones Tract was scaled. Jones Tract pump-out water was estimated to contribute 1.8 mg/L and approximately 15,000 kg/d of TOC to Clifton Court Forebay. (An increase of 1.5 mg/L of DOC was associated with Jones Tract pump-out water as seen in the DSM2 fingerprint for Clifton Court Forebay from 10/31/04 to 12/20/04, and it is assumed that DOC contributed an average of 85 percent of the TOC.)

There are several assumptions implicit in the scaling of Jones Tract organic carbon concentrations and the distribution of organic carbon loads over the pump-out stage. Assumptions include the following.

- The TOC released while the water exports are interrupted does not contribute to the organic carbon loading at Clifton Court Forebay after the exports have resumed. This assumes that the processes that pushed back the salinity also pushed back the organic carbon. (For example, this could occur when the Delta is flushed prior to resuming exports.)
- There are similar amounts of dispersion and dilution of organic carbon in the modeled breach scenarios as seen by Jones 2004. This implies a similar amount of above Delta releases during the pump-out phase.
- The mass of organic carbon produced prior to the start of dewatering is evenly distributed over the pump-out duration. This would imply a constant pump-out rate.
- Organic carbon impacts from multiple islands are additive.

E.5 Results

The CALFED Water Quality Program Record of Decision water quality goal for Clifton Court Forebay and other southern and central Delta drinking water intakes is 3.0 mg/L TOC (Brown and Caldwell 2005). Background concentrations of TOC and DOC in the Delta are typically between 3-4 mg/L, but are often higher during winter storm events (DWR 2007).

The Metropolitan Water District of Southern California provided a cost associated with the treatment of Delta water for organic carbon concentrations up to 6 mg/L of TOC. (Delta water is treated by Metropolitan to ensure a total organic carbon concentration of less then 4 mg/L.) A cost increase of $18 per acre-foot is associated with enhanced coagulation (operations and maintenance costs, not capital investments). At a high enough concentration over a prolonged period of time, additional capital investment would be required to reliably treat the water. For example, a combined background and additional island TOC concentration that is greater than 6 mg/L for a duration greater than 1 month would not be reliably treated by enhanced coagulation.

If elevated TOC concentrations are sustained (greater the 6 mg/L for more than one month), the Delta water could be considered non-potable. (Short duration spikes of TOC are diluted during transport and storage of the State Water Project water.) Water exports could then be used for agricultural use but not for urban drinking water use, resulting in loss of drinking water supply during portions of the island dewatering.

The additional TOC concentrations due to the flooded peat islands were estimated at Clifton Court Forebay and modeled for Cases 1 through 6. Cases 1 through 6 are described in the Delta Risk Management Strategy (DRMS) Phase 1 draft Risk Analysis Report (URS/JBA 2007). Input was acquired from the Emergency Response and Repair model and the Water Analysis Module. Water export interruption durations were determined based on salinity.

Cases 2A, 3A, 4A, 5A, and 6A represent a late spring event with a levee failure date of June 1, 1927. Cases 2B, 3B, 4B, 5B, and 6B represent a summer event with a levee failure date of August 1, 1972. Cases 2C, 3C, 4C, 5C, and 6C represent an early fall event with a levee failure date of October 1, 1930. Case 1 had an indeterminate start date; it was modeled with a June 1, 1927 levee failure date.

Two critical thresholds are determined for the model -- the level for which water treatment for TOC is necessary and the level for which water treatment by enhanced coagulation is no longer effective for TOC. In the model, the background TOC concentration for the Delta was assumed to be 3 mg/L. (A variable background concentration was not modeled.) Therefore an addition of 1 mg/L TOC would increase water treatment costs and a sustained increase of more then 3 mg/L TOC would not be able to be reliably treated by enhanced coagulation.

Cases 1 through 6 had minor to severe impacts due to increases in TOC concentrations at Clifton Court Forebay. Figures 2-17 illustrates the additional TOC concentrations expected at Clifton Court Forebay in Cases 1 through 6.

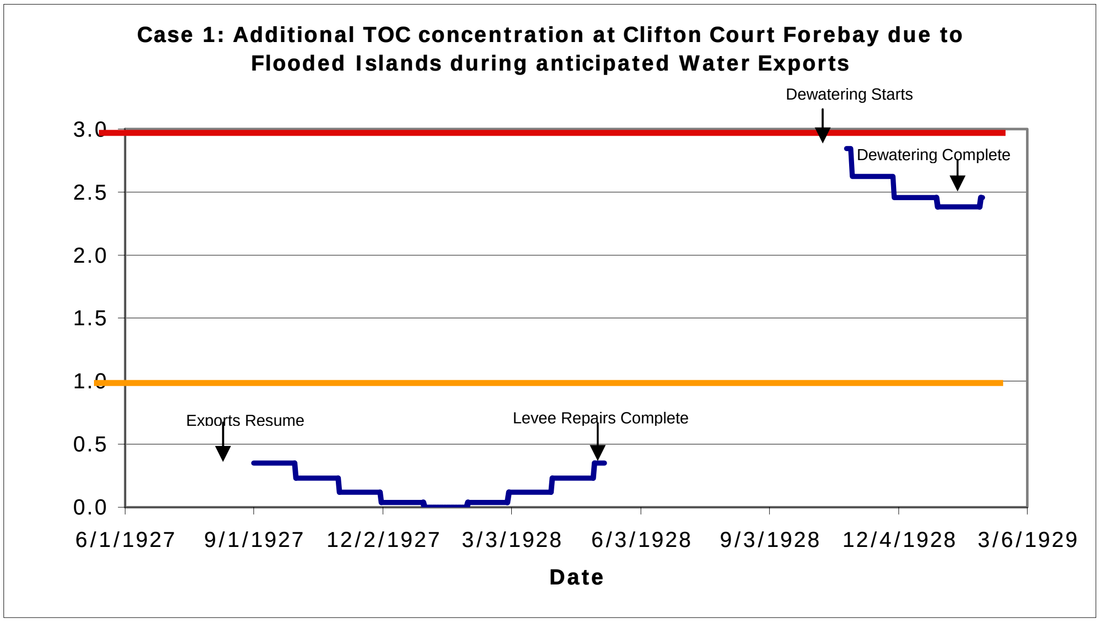


Figure 2 Case 1: One levee breach on Brannan-Andrus Island

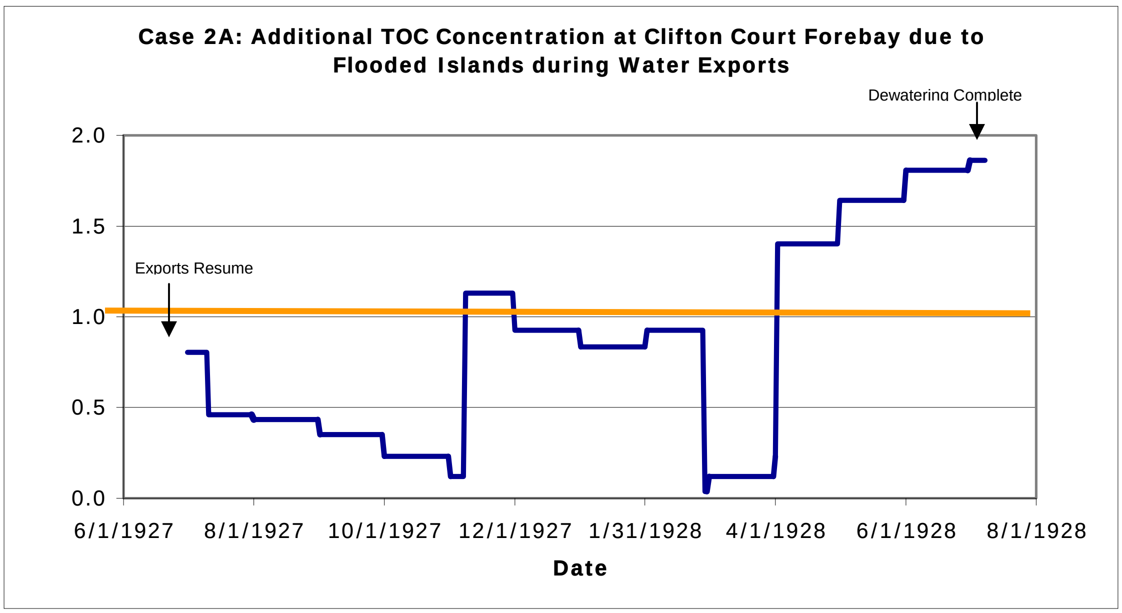


Figure 3 Case 2A: Three islands with one breach each (late spring event)

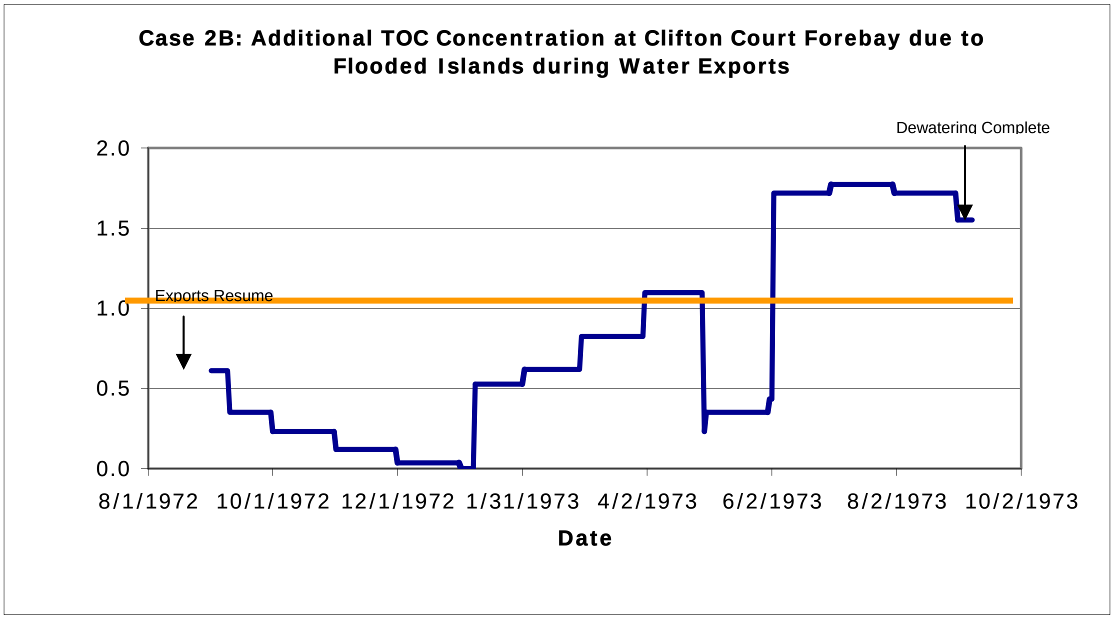


Figure 4 Case 2B: Three islands with one breach each (summer event)

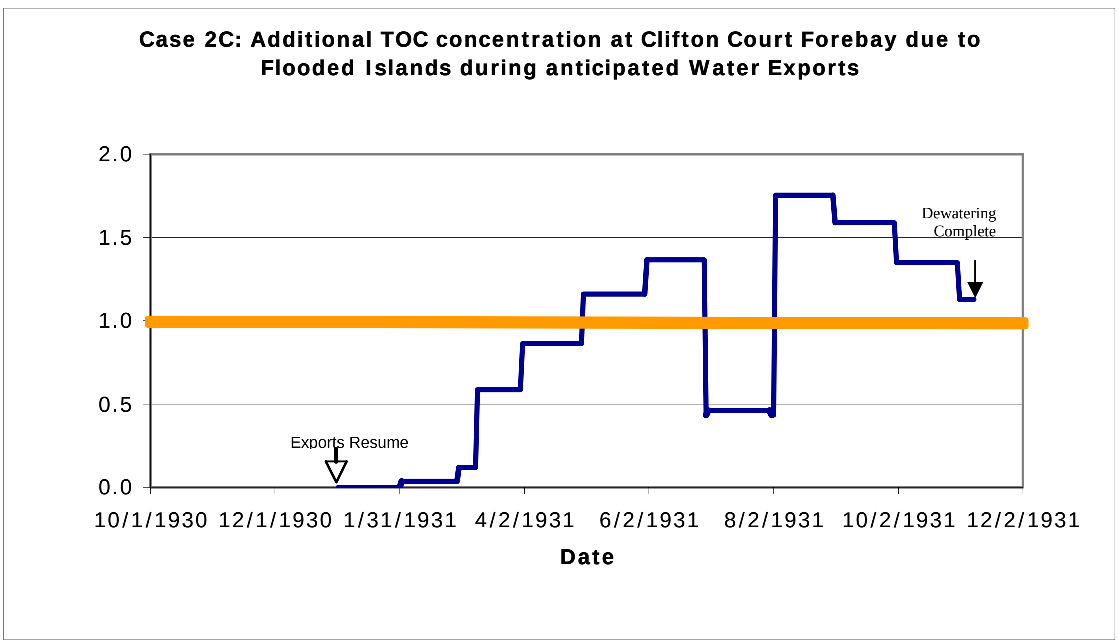


Figure 5 Case 2C: Three islands with one breach each (early fall event)

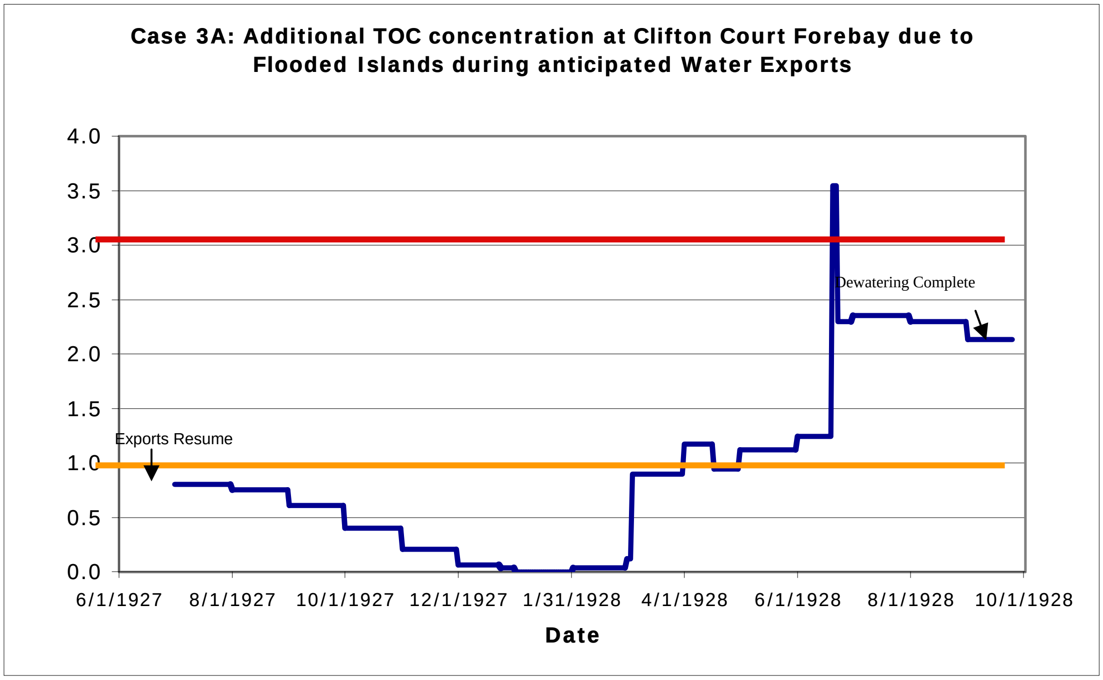


Figure 6 Case 3A: Three islands with one breach each, additional islands damaged but not flooded (late spring event)

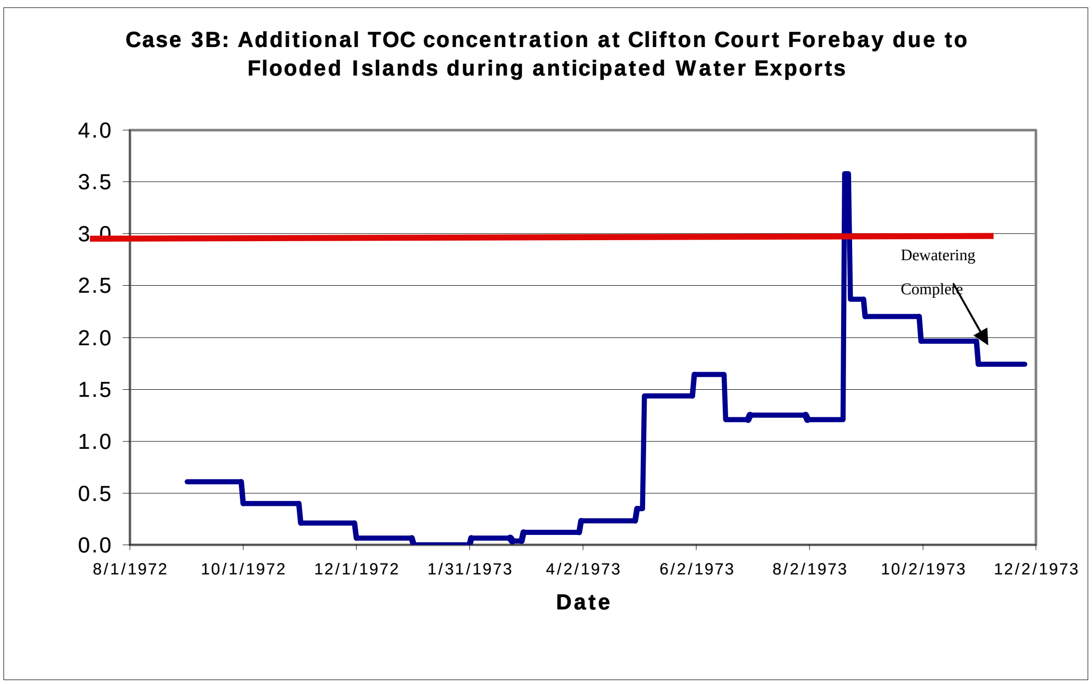


Figure 7 Case 3B: Three islands with one breach each, additional islands damaged but not flooded (summer event)

Dewatering
Complete

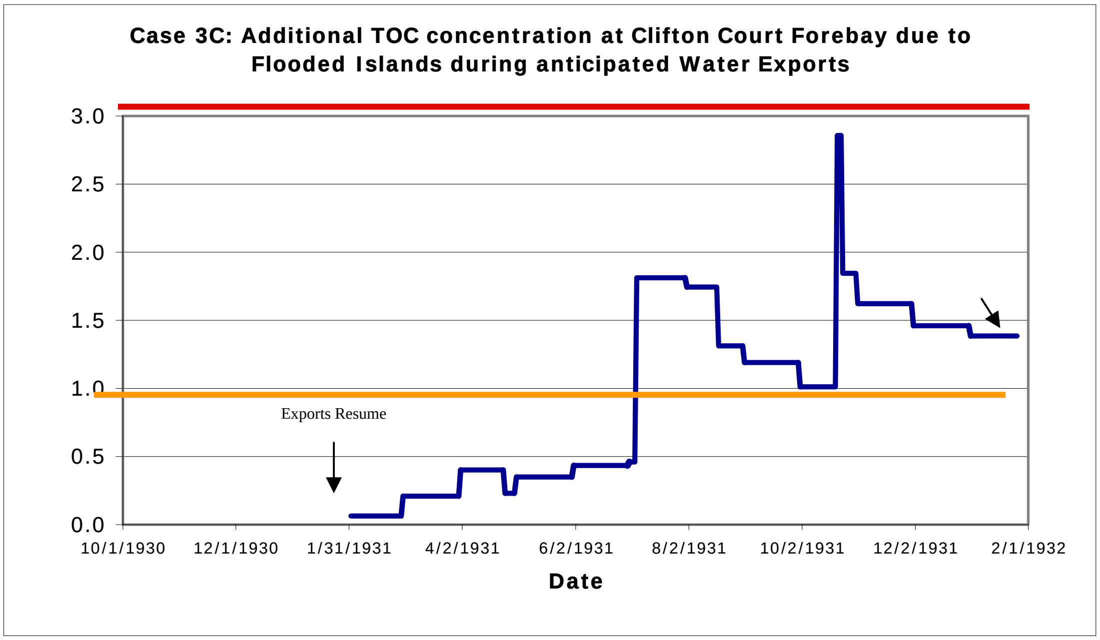
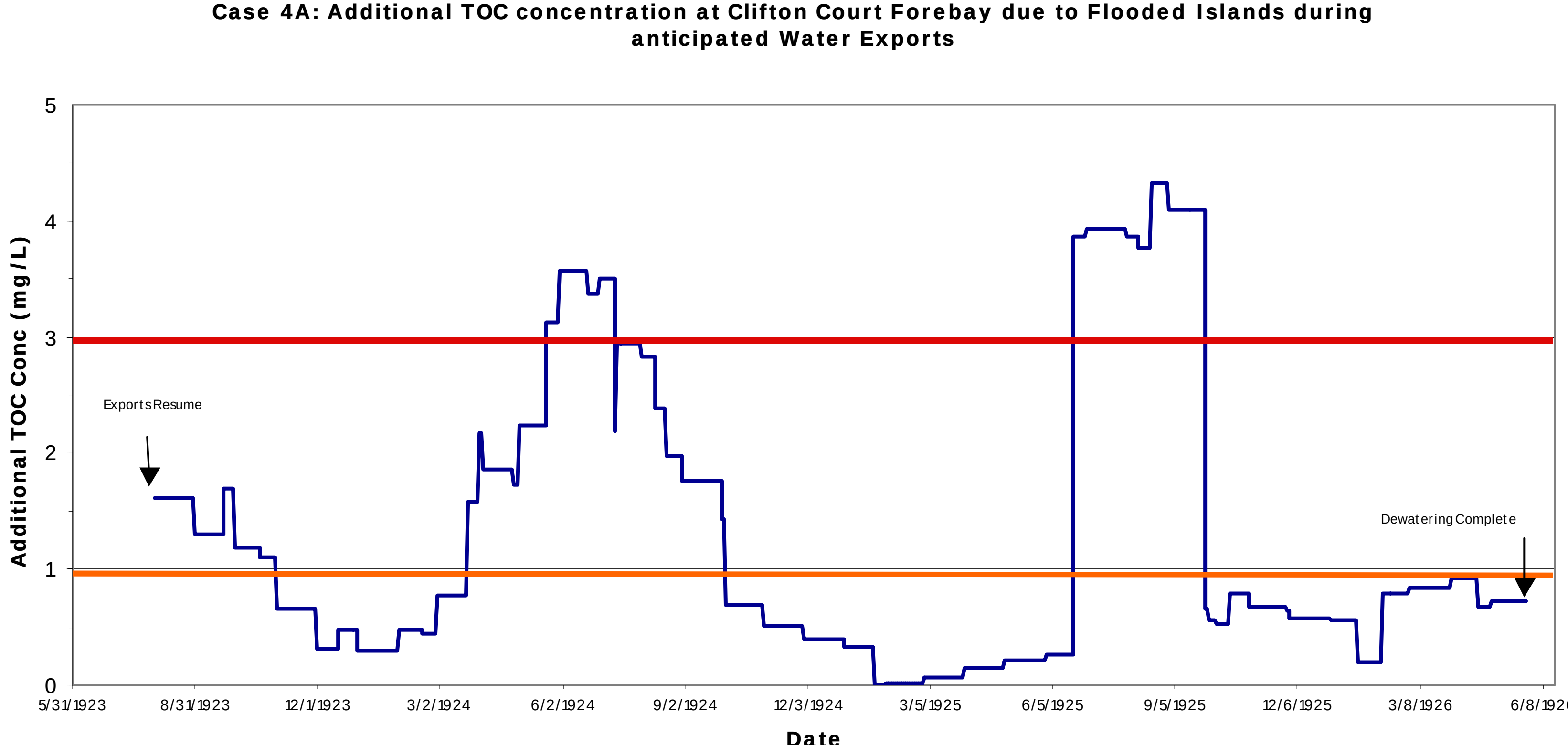
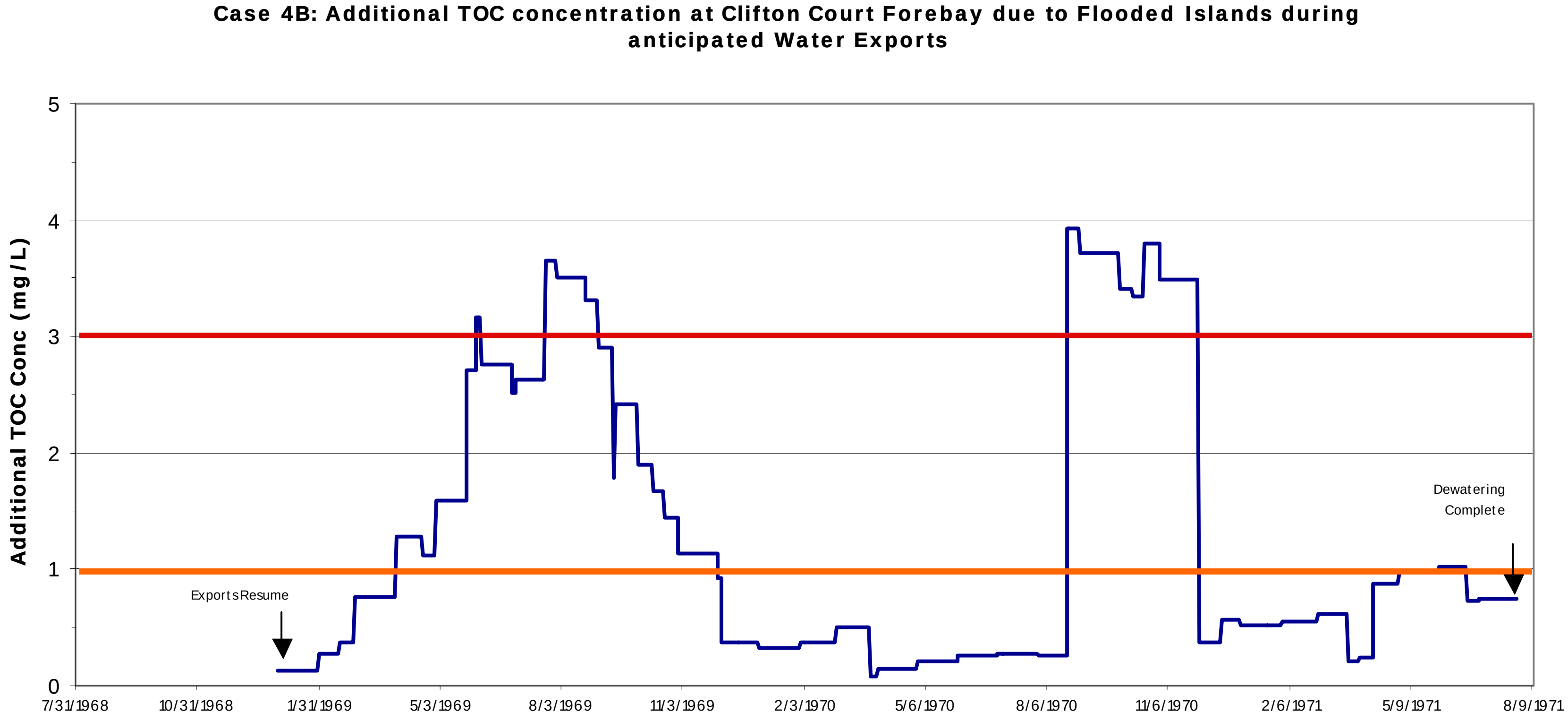


Figure 8 Case 3C: Three islands with one breach each, additional islands damaged but not flooded (early fall event)



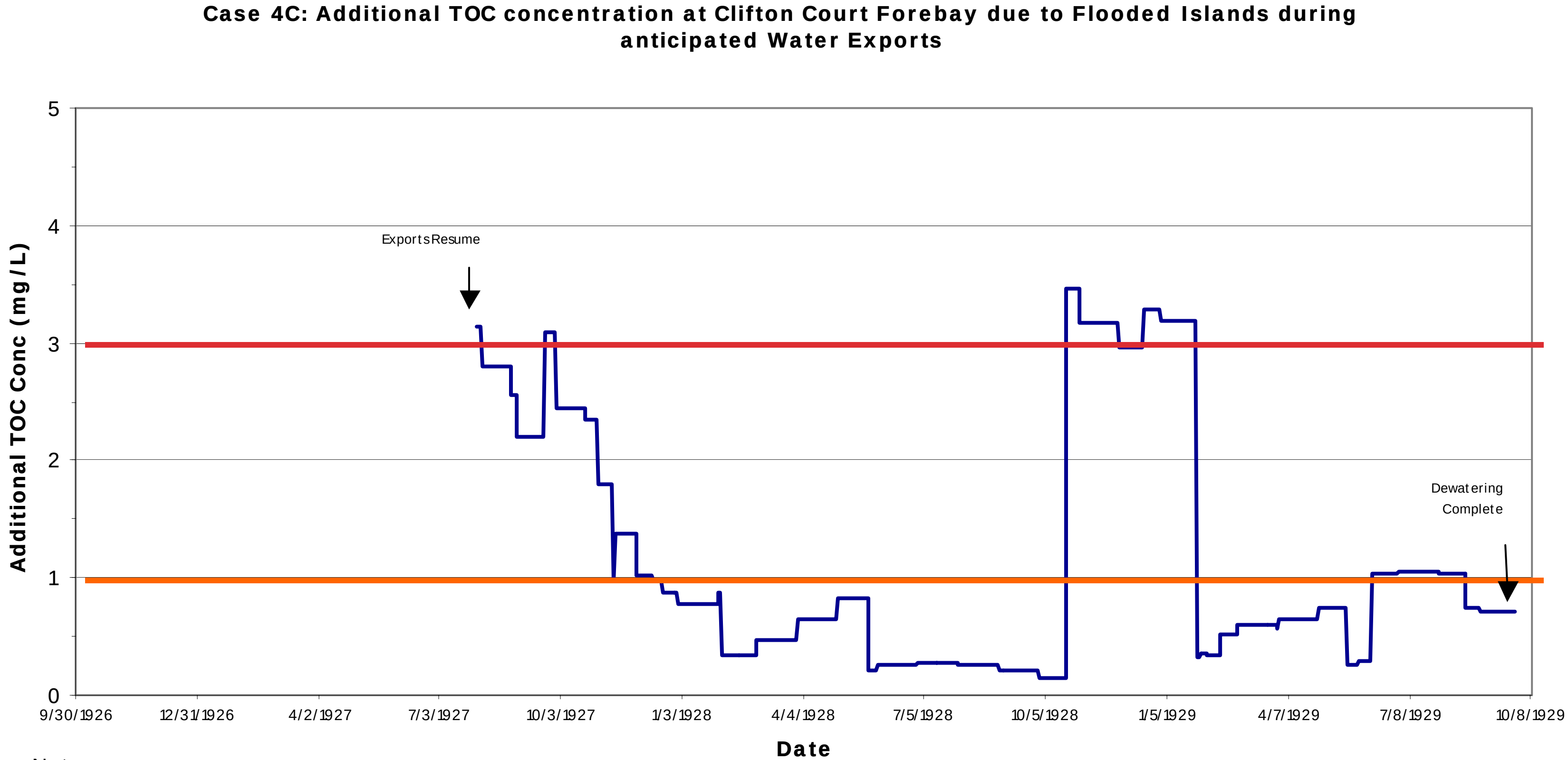
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 9 Case 4A: Eleven levee breaches among ten Delta islands (late spring event)



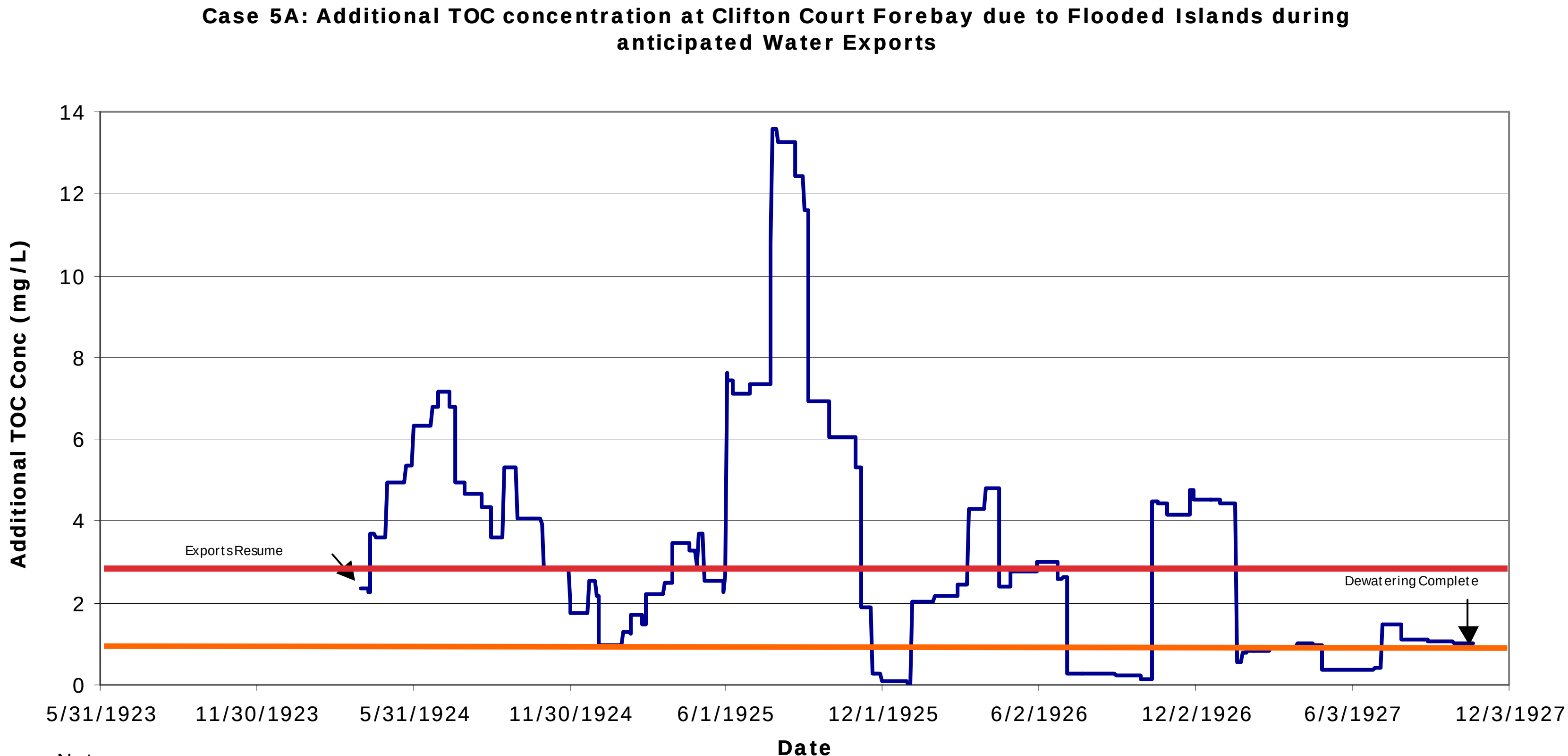
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 10 Case 4B: Eleven levee breaches among ten Delta islands (summer event)



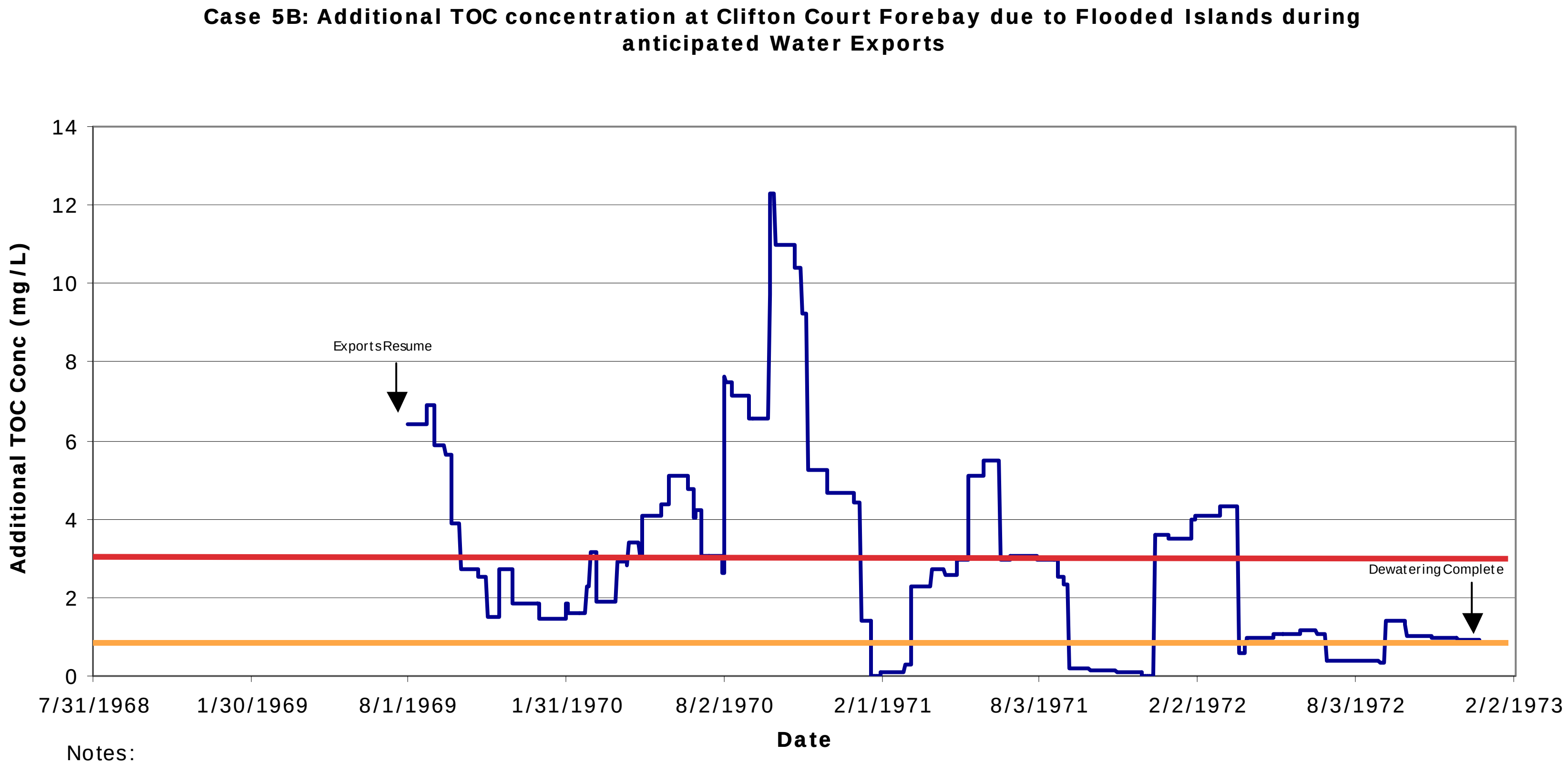
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 11 Case 4C: Eleven levee breaches among ten Delta islands (early fall event)



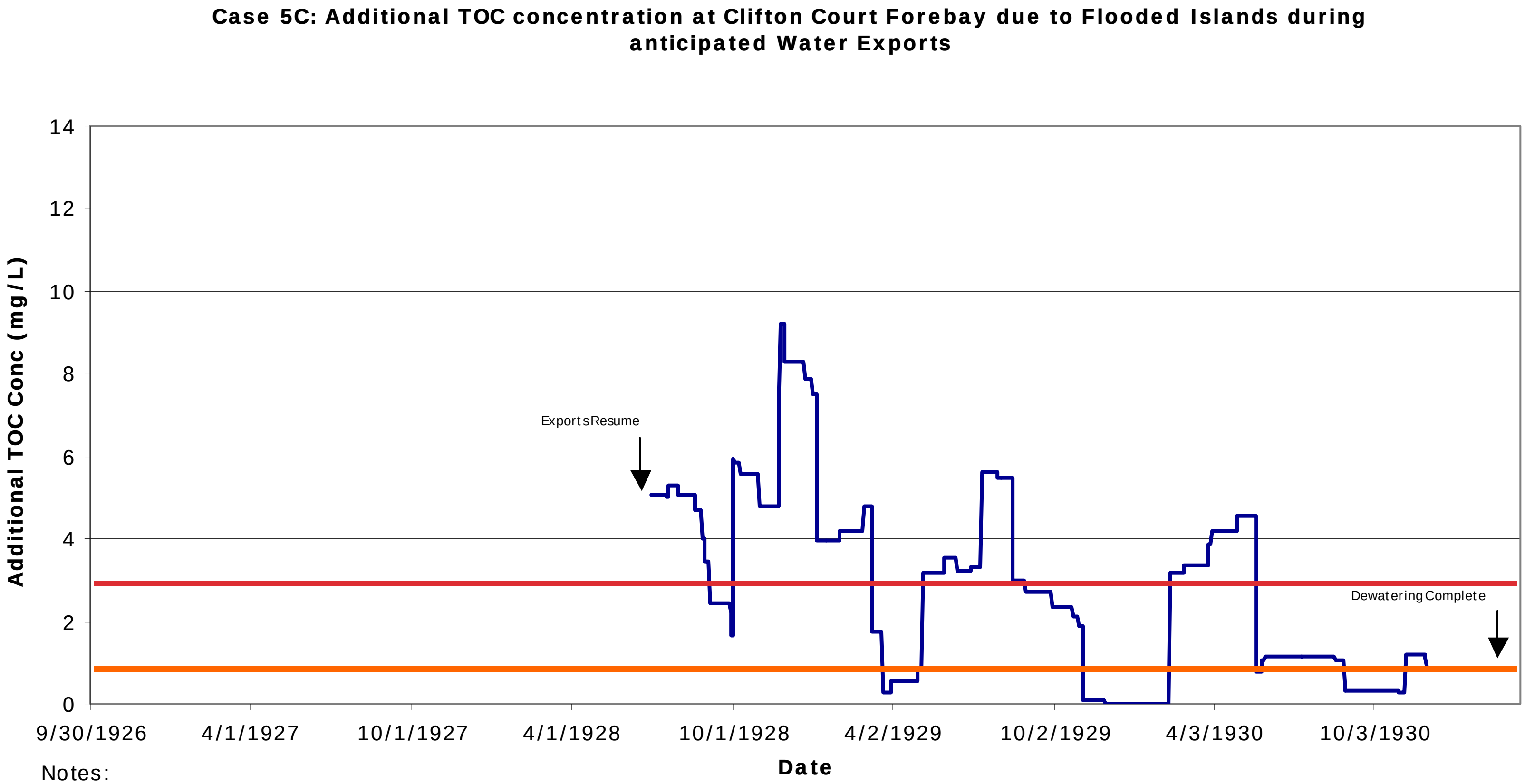
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 12 Case 5A: Thirty-six levee breaches among twenty Delta Islands (late spring event)



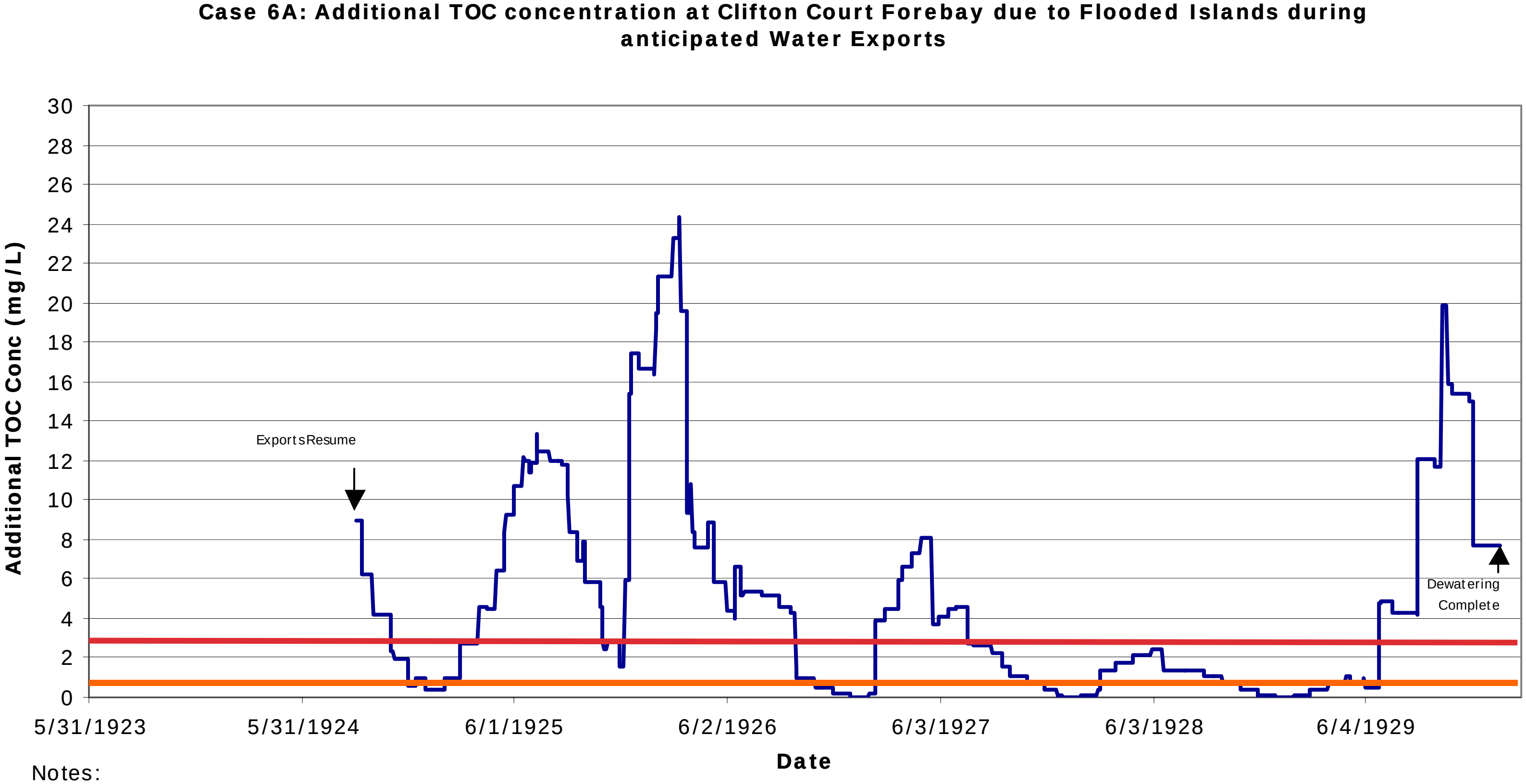
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 13 Case 5B: Thirty-six levee breaches among twenty Delta islands (summer event)



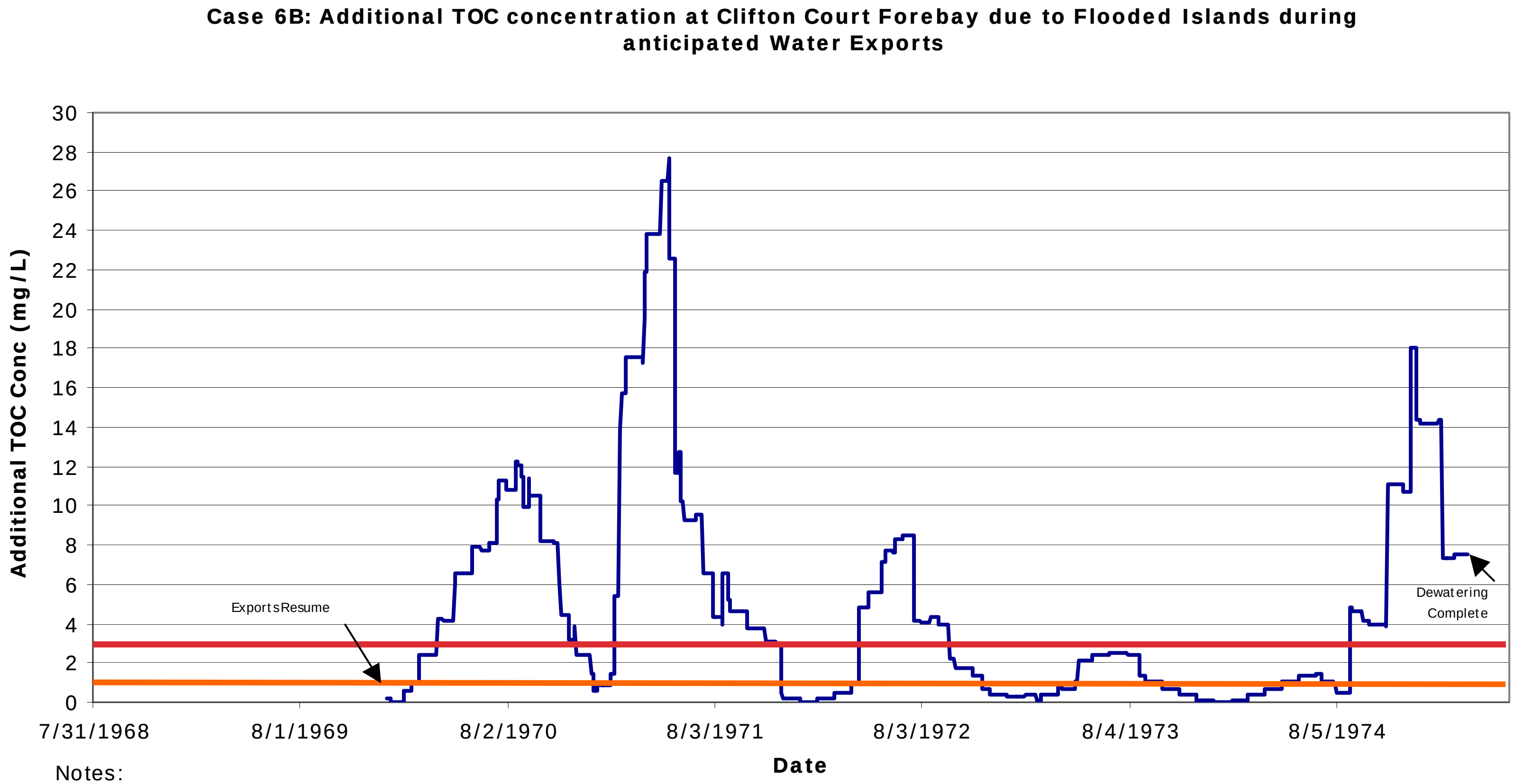
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 14 Case 5C: Thirty-six levee breaches among twenty Delta islands (early fall event)



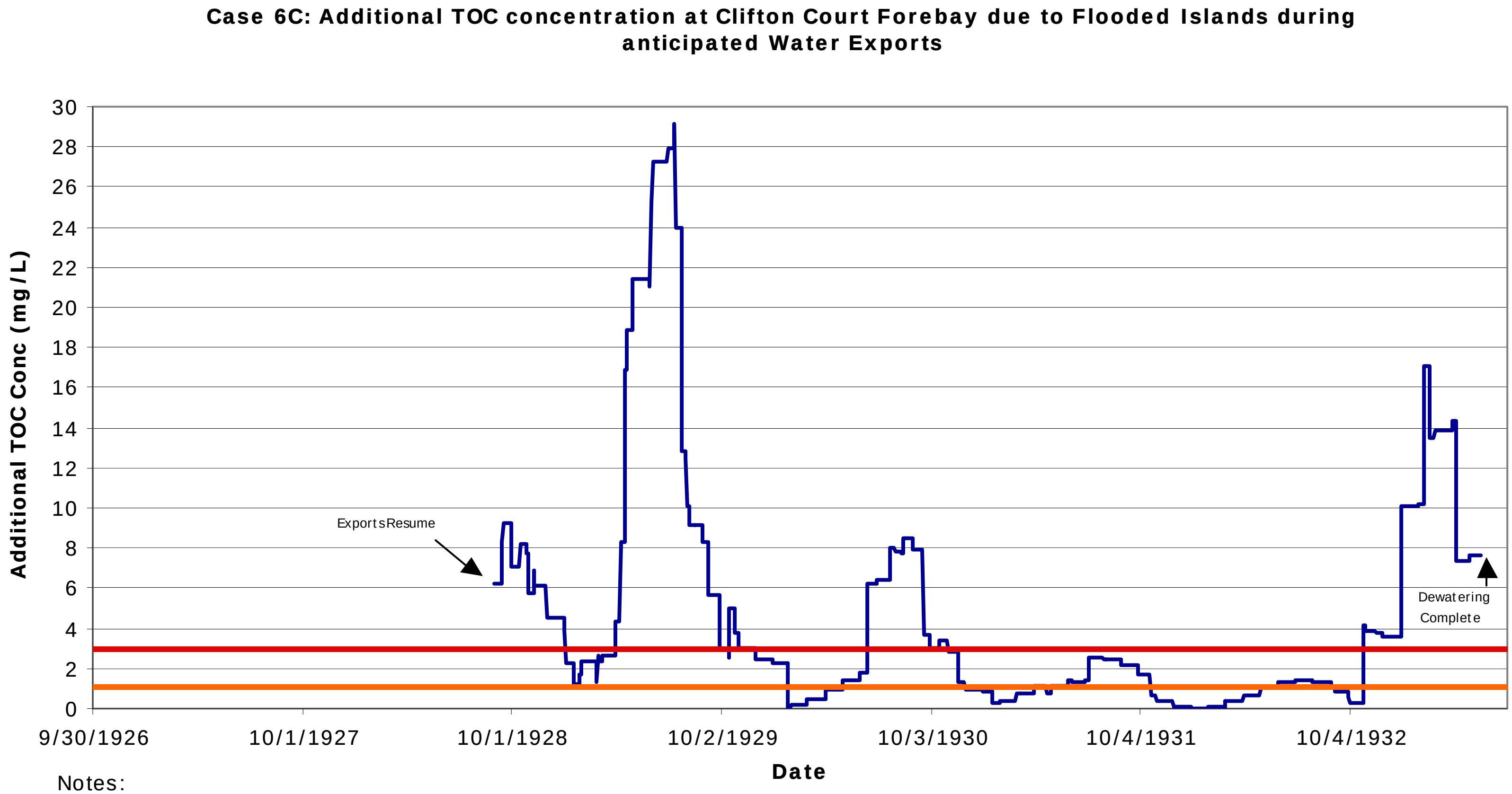
Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 15 Case 6A: Forty-six levee breaches among thirty Delta islands (late spring event)



Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 16 Case 6B: Forty-six levee breaches among thirty Delta islands (summer event)



Notes:
Assumed background TOC concentration for Delta water is 3 mg/L. Higher background concentrations may occur during winter storm events. Treatment costs are associated with a TOC increase of 1 mg/L (orange line). Treatment goal is less then 4 mg/L TOC from all sources. Exports are potentially curtailed when additional TOC is greater then 3 mg/L (red line). Treatment by enhanced coagulation is effective up to a combined background and additional TOC concentration of 6 mg/L.

Figure 17 Case 6C: Forty-six levee breaches among thirty Delta islands (early fall event)

E.6 Costs

The water treatment costs for excess organic carbon were provided by the Metropolitan Water District of Southern California. For a TOC concentration of 6 mg/L, the cost for enhanced coagulation is $18 per acre-foot. This cost is for enhanced coagulation operations and maintenance only, since Metropolitan has already made these capital investments. Enhanced coagulation operation and maintenance costs include chemical costs (coagulant and polymer) and solid handling.

A TOC concentration of 6 mg/L is considered very high and is at the upper end of the range of TOC concentrations that Metropolitan has historically observed in treatment plant influent. This cost was derived from actual treatment operations at Metropolitan's Mills treatment plant in Riverside, which treats 100% State Water Project water. If organic carbon concentrations were to occur above 6 mg/L for a sustained period of time (more than a month), additional capital investment would be required to reliably treat the water. Sustained TOC concentrations are less likely to be diluted during transport.

Table 2 shows the water treatment costs associated with Delta water that has an additional 1-3 mg/L TOC at Clifton Court Forebay. The number of days associated with the possibility of additional export interruptions is also included. Water treatment costs were not estimated for additional TOC concentrations greater then 3 mg/L. Additional water treatment costs may occur if water is exported during this time. Costs associated with additional export interruptions were not quantified.

Table 2 Estimated Costs Associated with Case 1 Through 6

Case	Possible Export Interruption (days)	Increases treatment due to TOC loading		
		Additional treatment needed (days)	Estimated Volume (acre-feet)	Estimated Treatment Cost
1	0	100	660,000	$12,000,000
2A	0	120	820,000	$15,000,000
2B	0	130	860,000	$15,000,000
2C	0	160	1,100,000	$19,000,000
3A	3	160	1,100,000	$20,000,000
3B	3	200	1,400,000	$25,000,000
3C	0	210	1,400,000	$25,000,000
4A	150	230	1,600,000	$28,000,000
4B	140	220	1,500,000	$27,000,000
4C	90	210	1,400,000	$25,000,000
5A	550	400	2,700,000	$49,000,000
5B	500	430	2,900,000	$53,000,000
5C	430	240	1,600,000	$29,000,000

Table 2 Estimated Costs Associated with Case 1 Through 6

Case	Possible Export Interruption (days)	Increases treatment due to TOC loading		
		Additional treatment needed (days)	Estimated Volume (acre-feet)	Estimated Treatment Cost
6A	940	450	3,000,000	$54,000,000
6B	900	380	2,600,000	$47,000,000
6C	700	560	3,800,000	$68,000,000

Notes:

Cost is $18/acre-foot for enhanced coagulation operations and maintenance only.

Assumes that 50% of the combined SWP (Banks Pumping Plant) and CVP exports would be treated with enhanced coagulation when the additional island derived TOC is greater then 1 mg/L and less then 3 mg/L at Clifton Court Forebay.

Assumes an average annual intake of 4,927 TAF from Clifton Court Forebay (DWR 2005).

E.7 Conclusions

A simplified model was used to estimate the amount of organic carbon production for each island in the six cases described in the DRMS Phase 1 report. Scaling factors were then applied to estimate the amount of total organic carbon (TOC) that originated from the islands and was transported to southern Delta water export facilities. The increases in water treatment costs associated with enhanced coagulation were calculated to provide an order of magnitude cost estimate for water treatment due to organic carbon increases at drinking water intakes. Additional costs would be incurred to treat the sustained increases predicted by the model in Cases 4, 5, and 6. These additional costs could include additional capital improvements by drinking water treatment facilities or the costs related to additional water export interruptions.

Repair schedules could be modified to reduce the predicted magnitude and duration of TOC concentrations. The following factors contributed to a greater organic carbon impact at Banks Pumping Plant.

- Longer duration between levee repair and island pump-out.
- Several islands pumped during the same time period.
- Accelerated island pump-out rates.
- Larger island size.
- Closer distance between the flooded island and Clifton Court Forebay (with a net flow direction to the pumps).

Hydrodynamic modeling was not used for the transport of organic carbon from the islands to the Banks pumping plant. Particle tracking would decrease the amount of uncertainty associated with the dispersion and dilution of TOC.

E.8 References

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